THE SUPPLY AND EXPORTS OF CERTAIN ELECTRICAL AND ALLIED MACHINERY AND PLANT

Introduction

(i) The following report on the supply in and exports from the United Kingdom of certain electrical and allied machinery and plant is submitted in compliance with Section 2 (1) of the Monopolies and Restrictive Practices (Inquiry and Control) Act, 1948. The reference was received from the Board of Trade on the 4th April, 1952, and varied on 27th February, 1953; it is reproduced in Appendix 1. The machinery and plant with which it is concerned is divided into three classes, (*a*), (*b*) and (*c*), which we are required to consider separately when reaching our conclusions.

(ii) The report is made hy a Group of memhers of the Commission, formally constituted on the 17th June, 1954, under Section 2 (2) of the Monopolies and Restrictive Practices Commission Act, 1953.

(iii) We have received evidence from a number of unincorporated Trade Groups of manufacturers (the Groups), which operate price and other arrangements, from the British memhers of The International Electrical Association Ltd. (IEA), which operates some similar arrangements in the export market, from The British Eleotrical and Allied Manufacturers' Association (Incorporated) (BEAMA), which is the main trade association in the industry and to which most manufacturers of the machinery with which we are concerned belong, and from a number of individual manufacturers.

(iv) We have received evidence from users of the machinery, including the Central Electricity Authority (CEA) and the Area Electricity Boards, the North of Scotland Hydro-Electric Board, some other nationalised industries and several Government Departments as well as commercial users and their agents at home and overseas and consulting engineers. We also advertised our readiness to receive in writing the views of anyone interested and we invited a numher of Commonwealth Governments to suhmit any evidence they thought relevant. From some witnesses we took oral evidence after we had considered their written suhmissions. A list of our principal sources of evidence is given in Appendix 2.

(v) Between July, 1954, and Fehruary, 1955, representatives of the Groups concerned with machinery in each of the three classes in our terms of reference, of the IEA and of the BEAMA attended hearings to clarify outstanding matters of fact; and in Octoher, 1955, after we had informed them of our provisional conclusion that the conditions of the Act* prevailed in respect of the supply and exports of machinery and plant in each of the three classes, the Groups, the IEA (British members) and the BEAMA attended further hearings at which they were represented by Counsel. The purpose of these hearings was to give each of the hodies concerned an opportunity of discussing with us whether the " conditions " or any of the " things done " operated against the public interest.

(vi) In May, 1955, we informed Associated Electrical Industries Ltd. (AEI) that one of the reasons for our provisional conclusion that the conditions of the Act prevailed as respects the supply in the United Kingdom of machinery and plant in class (*a*) was that two of its suhsidiary companies, Metropolitan-Vickers Electrical Co. Ltd. (Metro-Vick) and The British Thomson-Houston Co. Ltd. (BTH), together appeared to supply more than one-third hy value of all the machines in that class supplied in the United

* Throughout this report references to " the Act " are to the 1948 Act and not to the amending Act of 1953.

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Kingdom. In the same month we also informed the CEA that one of our reasons for that provisional conclusion was that more than one-third by value of all machines in that class supplied in the United Kingdom appeared to be supplied to one person, namely the CEA. We invited both AEI and the CEA to comment on certain matters which appeared to us to have a bearing on the public interest, but we did not take further oral evidence from either of them.

(vii) Our inquiry has taken more than four years to complete. This is due in the first place to the complexity of the subject and of the manufacturers' arrangements, and in the second to the unusually long time which at each stage of our inquiry it has necessarily taken some of the principal witnesses to collect information and assemble views. During the time occupied by our inquiry market conditions have changed appreciably and in some cases the manufacturers have modified their arrangements. We have taken such changes into account in assessing the evidence submitted to us, and we have taken care to supplement evidence collected in the early stages of our inquiry wherever we have judged this to be necessary. The scope of our inquiry into manufacturers' costs and profits was agreed in 1953 and includes the latest years for which results were then available, namely 1951 and 1952. In view of the time and expenditure which any extension of our original costs inquiry would have involved we have not sought detailed information for later years.

(viii) We wish to record our appreciation of the assistance given us by the Groups, the IEA (British members), the BEAMA, the CEA and all others who provided the information we required in our investigation. We recognise that the burden on some of those concerned has been extremely heavy. As some of the information we received relates to confidential business affairs, we have been careful not to disclose it in the report unless it was essential for a proper understanding of the issues.

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PART I—GENERAL

CHAPTER 1. GENERAL BACKGROUND

(1) Description of the Goods

1. The goods to which our terms of reference apply are :

(*a*) Alternators of not less than 300 kW maximum continuous rating designed to be driven by turbines; and steam turbines (including condensing and feed water heating equipment therefor) and hydraulic turbines for driving such alternators;

(*b*) Alternators (other than alternators described in (*a*) above) of not less than 10 kVA rated output; direct current generators of output equal to not less than ·75 kW per 1,000 revolutions per minute and of not less than ·75 kW actual rating; alternating current electric motors of not less than 1 horse power at any speed; and direct current electric motors of output equal to not less than 1 horse power per 1,000 revolutions per minute and of not less than 1 horse power actual rating;

(*c*) Transformers of not less than 5 kVA rated output.

Throughout our report we refer to goods under any of these sub-headings as plant, machines or machinery in class (*a*), (*b*) or (*c*) as appropriate. For drafting purposes we have not always found that any useful distinction can be made between the terms plant and machinery.

2. Class (*a*) covers steam and water driven turbo alternator plant;* these are in the main the types of plant which are installed in power stations for the large-scale generation of electricity. Steam or water power is applied to the prime mover, namely the turbine, which in turn drives the alternator which converts mechanical energy into electrical energy. In this class therefore we are concerned with the prime mover as well as with the electrical machinery which it drives. In the case of steam plant our reference also covers the condensing and feed water heating equipment which are essential links in the circulatory system of the steam after it has passed through the turbine and before it is returned to the boiler. The boiler system itself is outside our terms of reference.

3. Class (*b*) includes all generators other than those in class (*a*)† and all electric motors (except that in both cases there is a minimum limit of output). Generators in this class are normally used to produce electricity for a limited purpose (e.g. to operate the power or lighting system of a single building) in circumstauces where the public supply is not available or stand-by plant is essential.‡ They may be driven by oil, petrol, gas or steam engines,§ but these prime movers are not within our reference. Electric motors convert electrical energy into mechanical energy and have a wide variety of uses and users.

4. Class (*c*) covers all but the very smallest transformers. Transformers are apparatus without any moving parts normally used either for raising the voltage at the power station for economy in transmission or for subsequent

* Class (*a*) also includes any alternators which are driven by gas turbines, but not the gas turbines themselves: the application of gas turbines in this field is at present largely experimental.

† An alternator is a generator of alternating current.

‡ Turbine driven alternators having an output of less than 300 kW and all turbine driven D.C. generators are in class (*b*), but are comparatively rare.

§ Some generators are driven by electric motors in motor generating sets for special purposes.

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reduction of the voltage to a value suitable for use by the consumer. The larger transformers within our terms of reference are for the most part required by electricity supply authorities, but small transformers are also used by consumers for adapting the public supply to their own particular purposes.

5. The machinery in each of these classes and the circumstances and arrangements relevant to supply and export in each class are described in detail in Parts II, III and IV. It is convenient here, however, to indicate in general terms the relation between the machinery under reference and electrical machinery as a whole, and also the relation of the three classes to one another.

6. The 1951 Census of Production gives the value of the total gross output of the electrical industry* in the United Kingdom in that year as £726·6 million. Of this total, the output of the "electrical engineering (general)" trade accounted for £363 million; of the latter figure approximately £70 million was attributable to machinery within our terms of reference. The figure of £70 million includes most but not all machinery within our terms of reference. In Appendix 14 Table 1 we show the value of United Kingdom production in selected years from 1907 to 1951 of electrical and allied machinery and plant corresponding as closely as possible to that within our terms of reference; the figure for 1951 was approximately £80 million.† It is estimated that some sixty to seventy thousand persons are employed by the manufacturers in the production and distribution of machinery within our terms of reference.

7. In the years 1951 and 1952 the value of United Kingdom manufacturers' net sales‡ of machinery in the three classes was as follows:—

Class	1951			1952		
	Home	Export	Total	Home	Export	Total
	£'000	£'000	£'000	£'000	£'000	£'000
(*a*)	10,486	10,295	20,781	11,331	11,942	23,273
(*b*)	26,263	9,322	35,585	31,406	10,374	41,780
(*c*)	10,928	8,187	19,115	13,530	9,282	22,812
TOTAL	47,677	27,804	75,481	56,267	31,598	87,865

The machinery to which these figures relate includes a wide range of types and covers a size range varying from a 1 h.p. motor to a 200 MW turbo alternator set. Both manufacturing and selling conditions differ considerably as between these two extremes. Large machinery is made to order according to the requirements and conditions of the individual contract; it takes a long time to complete and its manufacture requires extensive capital equipment.

* We have taken the "electrical industry" to include the following "trades": electrical engineering (general), electric wires and cables, radio and telecommunications (private firms), batteries and accumulators, electric lighting accessories and fittings.

† The classification "electrical engineering (general)" covers a number of main subdivisions, of which the principal is "electrical machinery" with a total gross output by specialist producers of £195,091,000; in addition to machinery within our terms of reference "electrical machinery" includes fractional horse power motors, rectifiers, starting and control gear, switchgear and other miscellaneous items. Condensers and feed water heating equipment and certain turbines within our terms of reference are classified under "mechanical engineering (general)" for the purposes of the census; this accounts for the difference between the figure of £70 million mentioned above and that of £80 million shown in Appendix 14, Table 1.

‡ By net sales here and elsewhere in the report we mean sales after deducting sales between manufacturers.

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The preparation of specifications and the submission of tenders necessarily involve a great volume of preliminary technical and estimating work, and the successful tenderer usually undertakes either the whole of the responsibility for erection or responsibility for technical supervision of erection. At the other end of the scale manufacturing methods which are closer to mass-production than those used for any other products within our terms of reference can be applied to small motors and small transformers; the smallest machines are sometimes made for stock and the time required to manufacture is relatively short. The manufacture of small machinery by itself does not call for the same financial resources or involve the same financial risks and uncertainties as the manufacture of large machines, and the conditions of supply and contract for small machines differ from those for large machines.

(2) The Manufacturers

8. The machinery within the reference is made by a large number of manufacturers who vary considerably in size of organization and range of interests. There are four manufacturers (the British Thomson-Houston Co. Ltd. (BTH), Metropolitan-Vickers Electrical Co. Ltd. (Metro-Vick), The English Electric Co. Ltd. (English Electric) and The General Electric Co. Ltd. (GEC)) each of whom makes or supplies the whole or nearly the whole range of machinery covered by the reference; all four also make many other products not covered by the reference. Three of these businesses were founded between 1889 and 1899 and the fourth (English Electric) in 1918 when it amalgamated the interests of five smaller existing manufacturers. Two of the four (BTH and Metro-Vick) are wholly owned subsidiaries of Associated Electrical Industries Ltd. (AEI). The net assets of AEI, English Electric and GEC amounted to about £130 million in 1952 and to nearly £155 million in 1954.* There is a fifth company, C. A. Parsons & Co. Ltd. (Parsons), which, although its interests are less widely spread, ranks in importance with the four manufacturers named above so far as our reference is concerned; it is one of the largest producers of machinery in class (*a*) and a considerable producer of machinery in class (*c*). At the other end of the scale there are a number of concerns which make machinery of one type, or a few related types. Some of these manufacturers are medium sized, specialist concerns making a full range of a given type of machine. Others, particularly some of the motor and transformer makers, make only a limited range of the smaller sizes within one type; one such manufacturer, making a range of motors up to 250 h.p., is one of the largest producers of machinery in class (*b*) and had net assets in 1954 of nearly £2 million, but generally the companies concerned are smaller. There are also some very large concerns whose main interests lie in fields outside the electrical engineering industry and whose production of machinery within our terms of reference may be confined to a single type or a limited range required for incorporation in their own main products. Between these two extremes there are many medium sized companies with varying ranges of interest in machinery in two or all the classes of the reference.

9. There are relatively few makers of machinery in class (*a*); in the case of steam plant most of them were already established by the early years of the century and there have been no newcomers since 1930. There are many

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* The net assets of each company were:—

	1952	*1954*
	£	£
AEI	54,608,485	62,847,260
English Electric	30,225,264	41,041,114
GEC	45,774,167	51,017,508

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more manufacturers of machinery in the other two classes: in both there was a fairly regular expansion, measured in terms of new entrants, during the years leading up to the 1939-45 war; while this expansion has continued since the war, it has been more marked in the case of class (*c*) than of class (*b*).

10. The methods of manufacture and the degree of specialisation within a single factory or workshop differ widely according to the type of machinery, the individual manufacturer concerned and his range of interests. Practice regarding the purchase of materials and the extent to which semi-manufactured components such as iron castings are bought in, or made or finished by the electrical manufacturers themselves is similarly diverse.

11. The principal trade association in the electrical industry is The British Electrical & Allied Manufacturers' Association (Incorporated) (BEAMA). Most manufacturers of machinery covered by our reference are members of the BEAMA. We describe its organisation and general activities in Chapter 2. The BEAMA is not concerned with the commercial policy of its members, but there are two other organisations of manufacturers, the Trade Groups and The International Electrical Association Ltd. (IEA), both of which operate agreements on prices and other matters. We describe the activities of these two organisations generally in Chapters 3 and 4 respectively, but most of the rest of our report is concerned with their arrangements. Nearly all manufacturers of large machinery and those responsible for most of the output of small machinery are signatories of Group and IEA agreements relating to the types of machinery which they manufacture. The exceptions are noted later.

(3) Materials and Manufacturing Processes

12. The materials used in the manufacture of machinery covered by our reference include: cast iron for low pressure turbine casings, and some motor frames; cast or forged steel for high pressure turbine casings; carbon or mild steel for the fabricated casings of large alternators, motors and transformers; alloy steel for turbine blading and turbine and alternator rotors; electrical sheet steel for the laminated cores of transformers, generators and motors; copper, mainly in the form of wire, strip and rod for the windings of motors, generators and transformers; brass in the form of tube and plate for condensing plant; insulating materials, including paper, rubber, mica, glass, porcelain, plastics and oil.

13. The component parts of the heavier electrical machines and turbines are specially designed for each order, but the method followed by the manufacturers in obtaining these parts will vary from factory to factory. All buy forgings and steel castings, but not all have them "rough machined". Some make their own iron and non-ferrous castings; some drill their own condenser plates, but all buy condenser tubes ready for use. Certain manufacturers buy their electrical steel already punched for a particular application.

14. The machinery itself is for the most part made to order. The diversity of requirements and the intricacy of the engineering problems involved offer little scope for the application of flow or batch production methods to any but the smallest machines, and the manufacturers have described the industry as a "jobbing shop". Certain types of small machinery, particularly the smaller motors and transformers, are usually produced in workshops specially designed for these types of machinery alone, but the larger types are made in shops which can be used for a large variety of similar electrical machinery. The practice of individual manufacturers differs widely, however: some equip their shops with general purpose machine tools such as lathes, boring

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mills and presses; others find that the demand for a particular type or range of machine is great enough to warrant the installation of some special purpose machine tools, often of their own design. The extent to which this kind of specialisation can he carried is limited by the very high cost of the capital equipment required to produce all heavy electrical machinery. Most of the larger manufacturers have extended or rebuilt at least part of their works since the war.

(4) Markets and Buyers

15. We refer later to the rate of growth of electricity consumption hoth in the United Kingdom and in the world as a whole (see paragraphs 39 and 40). Increased consumption necessarily reflects increased demand for electrical machinery and there can he no douht that the world market for machinery, including the market in the United Kingdom, has increased rapidly and on the whole steadily throughout the present century.

(A) *Home Market*

16. In 1952 78·5 per cent. of all machinery in class (*a*) supplied in the home market was supplied to the Central Electricity Authority (CEA), and 66 per cent. of that in class (*c*) to the CEA and the Area Electricity Boards.* The nationalised electricity supply industry is thus the dominant huyer of hoth classes of machinery in this market, and it is the only home huyer of the largest machines in each class. The machinery in class (*b*) on the other hand is required hy a wide variety of purchasers for a wide variety of uses and there is no dominant huyer.

17. In Appendix 14 Table 2 we show for selected years between 1906 and 1954 the total value of imports into the United Kingdom and the proportion from each of the main countries of origin. In Tahle 3 we show for each of seven years between 1907 and 1951† the value of imports retained as a percentage of total home supply. The figures given in hoth tahles cover machinery in all three classes of the reference.‡ It will be seen that in the years shown since 1932, when the machinery became subject to a general tariff of 20 per cent. ad valorem, nearly the whole of the home market demand has heen supplied by United Kingdom manufacturers and that imports have generally represented not more than 2·5 per cent. Before 1931 the proportion of imports was somewhat higher (4·3 per cent. in 1930) and in the early years it was suhstantially higher (15·6 per cent. in 1907). Manufacturers in the United States of America and Germany have been the chief suppliers from overseas.§

(B) *Exports*

18. In Appendix 14 Tahle 4 we give for selected years hetween 1936 and 1953 the total value of exports of machinery in the three classes by the eight leading exporting countries of the world, with the percentage of the total supplied by each. It will he seen that over 70 per cent. was supplied from three countries—the United Kingdom, the United States and Germany. In the years 1936 to 1938 the United Kingdom had the largest share of the husiness (31 per cent. of the total exports of the eight countries), Germany had 30 per cent. and the United States had 15 per cent. In the years immediately after the war the German share was drastically reduced, the proportions for the years 1948 to 1950 being United Kingdom 35 per cent.,

* See paragraph 37.

† The years shown are those for which Census of Production returns are available.

‡ They also include a small amount of machinery which is outside the scope of our inquiry.

§ Sweden and Switzerland supplied a substantial proportion of total imports in the nineteen-twenties and thirties however.

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United States 35 per cent. and Germany 2 per cent. In the years 1951 to 1953 Western Germany with 15 per cent. was rapidly regaining the share of the market held by the pre-war German industry; the United States had the largest share, but the shares of both the United States (29 per cent.) and the United Kingdom (27 per cent.) were lower than in the preceding three-year period. The individual shares of other exporting countries were by comparison small.

19. In Appendix 14 Tables 6 and 7 we give the total value of exports from Germany and the United States in each of the years 1936 to 1938, 1948 to 1950 and 1951 to 1953, with the value of exports to each of the country's main overseas markets expressed as a percentage of the total. In Appendix 14 Table 5 we give similar information for exports from the United Kingdom for all years from 1904 to 1954 except war years. It will be seen that in the years covered the main export markets of United States manufacturers have been in Central and South America and Canada, those of German manufacturers in Western European countries and those of United Kingdom manufacturers in British Commonwealth countries, particularly South Africa, Australia and India.

20. United Kingdom manufacturers are allowed a tariff preference, ranging from 5 per cent. to over 20 per cent., in most Commonwealth countries including Australia, Canada, New Zealand and South Africa. Most of the other importing countries charge a general tariff ranging from 1 per cent. to 52 per cent. according to the type of machinery and irrespective of the country of origin.

21. Since the war the overseas purchaser's choice of supplier and the pattern of world export trade generally have been influenced to a greater extent than previously by considerations such as shortage of particular currencies, balance of payments difficulties and the policies of Governments in both the importing and the exporting countries.

(5) Statutory Control of Materials and Machinery; Home Market and Export Priorities

(A) *Materials and Machinery Production*

22. During and for some time after the war the supply of most of the principal materials used in the manufacture of electrical machinery was subject to Government control. In the case of iron and steel so used, licensing was not finally removed until May, 1953. The object of the iron and steel controls was to allocate available supplies between consumer industries in accordance with Government policy for priority of production. In practice this meant that during the war manufacturers of armaments received high priority and defence orders inevitably absorbed a large part of supplies. In the years following the war priority was given to industrial plant and equipment of importance to the civil economy, including equipment for export. In accordance with this policy electrical machinery enjoyed a high priority, but despite this priority the shortage of iron and steel was such that it was not possible to meet all the needs of the electrical machinery manufacturers.

23. Machinery within our terms of reference was not at any time subject to Government price control, but there was a licensing system for the supply of machinery. This lasted until November, 1948.

24. From November, 1947, to July, 1950, the production for the home market of steam turbines and steam turbine driven alternators of over 10 MW capacity in class (*a*) of our reference was restricted by Statutory Order to machines of 30 MW and 60 MW capacity, the purpose being to

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speed up the production of generating plant for the British Electricity Authority (BEA). Provision was made for building plant of other capacities for export.

(B) *Joint Consultative Bodies and the Allocation of Production Capacity*

25. In 1944 the Ministry of Fuel and Power formed a committee (the Heavy Electrical Plant Committee) for the purpose of agreeing post-war programmes for the Central Electricity Board (CEB). The Committee consisted of representatives of Government Departments, the machinery manufacturers and the supply industry. In 1946 the Committee's terms of reference were widened to include *inter alia* consideration of the ways and means of utilising the production capacity of the machinery manufacturing industry in connection with overseas trade as well as home requirements. In 1947 the membership of the Committee was widened to include representatives of additional manufacturers and of the trade unions. The enlarged Committee was to serve as a medium for advice and co-ordination between the Ministries concerned, the two electricity boards and industry, and to act as a steering body for increasing and accelerating the output of heavy electrical plant for home generating stations.

26. When responsibility for progressing plant for home power stations was transferred from the Ministry of Supply to the British Electricity Authority (see paragraph 37), the Committee's functions were much reduced and its composition was found to be unwieldy. In 1952 it was therefore reconstituted as the Heavy Electrical Plant Consultative Council, " to provide a means of regular consultation between the Government and the heavy electrical plant industry on matters affecting the well-being of the industry and its contribution to the national economy ". When responsibility for the industry rested with the Ministry of Supply the Council consisted of 12 representatives from the manufacturers (six from the electrical side and six from the boiler makers), three from the supply industry and two from the trade unions, with the Minister of Supply as Chairman. The Council has not met since responsibility for the industry was transferred to the Board of Trade in July, 1955.

27. Between 1950 and 1953 the Government issued three directives on the relative priorities to be given by manufacturers to the production of power station equipment for the home and for export markets. One issued in February, 1950, instructed manufacturers to treat orders for home power stations as a first call on their capacity in the interests of the country's economy as a whole,* and one issued in January, 1953, as elucidated by a directive of August that year, accorded export orders priority over all orders for the BEA's programme for 1957 to 1959 and over part of the programme for 1956, that is, with the exception of those orders to which the Authority had given " target " commissioning dates in 1953 to 1956.

(6) Research and Development

28. In 1916 the BEAMA formed a committee on research. The following year the Association joined with the Department of Scientific and Industrial Research and the Institution of Electrical Engineers to set up the Electrical Research Committee. We are told by the BEAMA that " this committee made the first organised attempt at co-operative research, placing the work out with various member-companies and the National Physical Laboratory ". The projects were financed entirely by the manufacturers.

* Equal priority was to be given to exports to dollar markets, provided this could be done without detriment to the home power station programme.

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29. The method of spreading co-operative research work over a number of different national and private laboratories was not entirely satisfactory and made co-ordination difficult. In 1920 therefore the Committee was superseded hy the British Electrical and Allied Industries Research Association (ERA). Many members of the BEAMA are also members of the ERA. Membership was later widened to include the electricity supply industry. By 1954 the Association employed a staff of 328 and had an annual income of about £340,000.

30. In addition to the work of the ERA, individual manufacturers have continued to expand their own research. It has been estimated that at the present time the electrical manufacturing industry as a whole (excluding radio and telecommunications) spends some £6 million a year on research (that is lahoratory-scale work) and a further £12 million a year on associated large-scale development work. The BEAMA estimates its memhers' annual expenditure on research and development at £11 to £12 million in addition to the financial support given to the ERA. According to the costing information we obtained, the total expenditure on research and development of the Group memhers in connection with machinery included in our reference amounted to nearly £2 million in 1952.* Approximately 85 per cent. of this total was spent by three of the four largest manufacturers (see paragraph 8); the accounting methods of the fourth do not allow the calculation of a figure on a comparahle hasis, hut this company also maintains a central research department dealing with fundamental and specific research over the whole range of its products. In the same year research expenditure by manufacturers outside the Groups so far as it was ascertainahle amounted to approximately 2 per cent. of the Groups' figure.

(7) Standardisation

31. Most of the machinery covered hy our terms of reference is not suited to standardisation of design or dimensions. In 1911 the BEAMA set up a Standardisation Committee to prepare for puhlication standard specifications relating to the performance of machinery in operation and to methods of testing. The standards issued hy this Committee remained in force until they were superseded hy standards issued hy the British Engineering Standards Association (BESA) set up in 1919. The BEAMA played a leading part in the estahlishment of the BESA, and BEAMA members were represented on most of the technical committees. In 1931 the work of the BESA was extended heyond the engineering field and the Association was renamed the British Standards Institution (BSI). At the present time nearly 1,500 technical representatives of BEAMA memhers serve on BSI committees. The Groups have told us that while the user interests are fully represented in the later stages of committee work in the BSI, the original drafts of all the British Standard Specifications relating to machinery within our reference have heen prepared "under BEAMA auspices, by committees furnished almost entirely hy Group-member firms". Approximately one-fifth of all published British Standard Specifications relate to the products of the electrical industry.

32. Work on international standardisation is carried out by The International Electrotechnical Commission (IEC), founded in 1904. Thirty-one countries are represented on the IEC, including all the major European countries and the United States of America. Representation is through

* The Groups have commented that the figure of £2 million "does not include fundamental research of a general character, the outcome of which might have a direct bearing on the design and performance of machinery within the inquiry", but the cost of which it is impossible to allocate to any particular product.

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"National Committees"; both manufacturers and a wide range of users are represented on the British National Committee, whose work is centralised through the BSI. The IEC does not issue agreed international standards, but makes recommendations which the collaborating countries are pledged to adopt in their national standards so far as this is practicable. We have been told that both British and Continental standards relating to the machinery covered by our reference are substantially in conformity with the IEC recommendations.

33. We refer in greater detail to particular aspects of standardisation as they affect each class of our reference in Parts II, III and IV of our report. The Groups estimate the cost to their members of work on standardisation at about £500,000 a year.

(8) Development of the Electrical Industry

34. The following paragraphs are confined to an outline of matters which appear to us necessary for an understanding of the origins and growth of the arrangements central to our inquiry; we make no attempt to give a comprehensive account either of the history of the supply and manufacturing sides of the electrical industry or of technical developments. The industry has been the subject of a number of earlier reports,* which we have used in preparing this summary, but we have also drawn on memoranda submitted in evidence to us.

35. The commercial application of electricity began with the development of the telegraph early in the nineteenth century and of street and indoor lighting supplied by dynamo towards the end of the century. The first transformer for use in connection with an A.C. series system for lighting was devised in Paris in 1883. In the following year the Hon. Charles A. Parsons produced and patented the first turbo dynamo, having a capacity of $7\frac{1}{2}$ kW. The principle of the electric motor was already known and in the 70's and 80's attempts had been made to apply this principle to electric traction.

36. The public supply of electricity in the United Kingdom has been governed by a series of Acts of Parliament. The supply system was established on a local basis under Acts of 1882 and 1888. Most of the distribution units, some of which were municipal and some commercial undertakings, were small. Many small units whose efficiency was low survived after technical advances had extended the use of electricity and increased the economic area of supply, and steps were taken after the 1914–18 war with a view to greater concentration of the generation of electricity. The Electricity (Supply) Act of 1919 proved ineffective: in 1925 there were still 572 separate supply authorities and 438 generating stations in the United Kingdom (excluding Northern Ireland). Under the "grid" scheme of the Central Electricity Board, which was set up by the Electricity Supply Act of 1926, a planned national distribution system was, however, developed. When the CEB was brought to an end and the British Electricity Authority set up in 1948, 95 per cent. of the electricity generated for public supply in the United Kingdom (excluding the North of Scotland and Northern

* Including the following:—
Report of the Departmental Committee appointed by the Board of Trade to consider the position of the Electrical Trades after the war. Cd. 9072: 1918.
Committee on Industry and Trade (the Balfour Committee): Survey of Metal Industries: 1928.
Report of the Imperial Economic Committee: A survey of the Trade in Electrical Machinery and Apparatus: 1936.

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Ireland) was produced by 143 stations and nearly all the distribution undertakings were being supplied directly or indirectly from the grid. In the meantime the Hydro-Electric Development (Scotland) Act of 1943 had established the North of Scotland Hydro-Electric Board to initiate and develop "all further means of generation of electricity by water power within the North of Scotland District".

37. Further legislation in 1947 provided for the nationalisation of the electricity supply industry as a whole and for the establishment of a Central Authority, the British Electricity Authority, and 14 autonomous Area Electricity Boards to own and operate the industry except in the North of Scotland District. The Act made the Authority responsible for the control of general and financial policy, for the generation of electricity and its supply to the Area Electricity Boards for distribution, and for the co-ordination of distribution by the Area Electricity Boards. In the North of Scotland District, as enlarged by the Act, the existing North of Scotland Hydro-Electric Board was given separate responsibility for both generation and distribution. The provisions of the Act became effective on 1st April 1948. More recently, the Electricity Reorganisation (Scotland) Act, 1954 provided for the transfer of the functions of the BEA in Scotland together with those of the two Scottish Area Electricity Boards to the newly formed South of Scotland Electricity Board; at the same time the title of the British Electricity Authority was changed to the Central Electricity Authority. We refer to the Authority throughout later chapters of our report as the CEA, although a part of the evidence taken by us was submitted by the BEA and refers to the period before the 1954 Act became effective; to avoid confusion we have amended references in quoted passages accordingly. We refer to the Area Electricity Boards as "the Area Boards".

38. The legislation of 1948 and 1954 did not affect the supply of electricity in Northern Ireland and the Scilly Isles, which are supplied by local undertakings.

39. The consumption of electricity in Great Britain has grown on average by about 12 per cent. a year from about 125 million kWh sold in 1901 to some 68,000 million kWh sold in 1955. From the early years of the century until 1930 the average increase in installed generating capacity was about 10 per cent. a year;* since 1930, however, plant capacity has increased on average by only about 5 per cent. per annum.† The maintenance of the growth of consumption in spite of the lower rate of increase in capacity since 1930 reflects the advantages resulting from the introduction of the grid and the co-ordination of supply under the CEB; the growth in capacity was retarded during and immediately after the last war, but since 1948 installed generating capacity has been increasing at 8 per cent. a year. We refer to the great increase in the size of electrical machinery for generation and transmission and to its improved efficiency in later sections of our report.

40. It has been estimated‡ that world consumption of electricity doubles approximately every ten years. The figures reproduced in Appendix 14 Table 8 support this view generally. Earlier reports on the electrical industry in the United Kingdom pointed out that much of the basic scientific work had been carried out by British scientists, and they suggested that consumption of electricity for power purposes had developed more slowly in the

* Namely, from 733 MW in 1907 to 6,600 MW in 1930.

† From 6,600 MW in 1930 to 22,572 MW in 1955.

‡ By the Chairman of AEI at the Annual General Meeting on 30th March 1955 and by the Chairman of C. A. Parsons & Co. Ltd. at the Annual General Meeting on 24th May 1955.

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United Kingdom than in some other countries partly because the earlier industrialisation of this country was based on steam, partly because of unsatisfactory legislation for the puhlic supply of electricity.

41. By the first years of the century many of those who are now the leading manufacturers of heavy electrical machinery were already estahlished. In these early stages of development all classes of electrical goods were made by the same concerns and in the same factories, and the earliest manufacturers often designed, sold and operated complete systems. The manufacturers have told us that there was no common ground between the various designers and makers; every customer needed machines to work on his own particular system and every manufacturer wanted to introduce new features to improve efficiency, reliahility and means of control. "With the ever-present threat of compulsory purchase" under the provisions of the Electricity Acts of 1882 and 1888, "the electricity supply companies sought maximum immediate profit, and bought their plant in the cheapest market. Many public hodies too were constrained hy their own rules to purchase always at the lowest price." The manufacturers add that these purchasers had of necessity to issue specifications defining the characteristics of the system for which new plant was required and many took the opportunity either to set out their own, often experimental, ideas on design or to impose onerous terms of contract. At the same time United Kingdom electrical machinery manufacturers faced foreign competition in their home market, particularly from Germany and the United States.* They say that in the early years of the present century these factors led to excessive manufacturing capacity and price cutting, with the result that in the period 1900–1914 more than a quarter of the suhscrihed capital of heavy electrical manufacturers failed to achieve a dividend. It was against this general hackground that the National Electrical Manufacturers' Association came into heing in 1902. In 1911 the Association's constitution was revised and it became The British Electrical and Allied Manufacturers' Association (Incorporated) (BEAMA). The years before the 1914–18 war also saw the estahlishment of a number of Trade Groups of manufacturers concerned with particular types of heavy machinery (the Groups). The relation hetween the BEAMA and these Groups, and their respective functions, are discussed in later chapters: very generally it may he said that while the BEAMA was, and is, concerned with representing the views of its members on matters of general interest to the industry including conditions of contract, the Groups have always had as their main ohject the regulation of prices, although in the early years their arrangements were not in most cases as comprehensive as they have since hecome.

42. The manufacturers' position improved during the 1914–18 war, partly because foreign competition in the home market practically ceased. After the war there was considerable technical development and a general increase in the size of plant. Foreign investment in United Kingdom companies was reduced and in some cases eliminated, and there were also certain regroupings and almalgamations between United Kingdom companies which resulted in the formation of larger individual units. The manufacturers have told us that in this period there were nevertheless violent fluctuations in the costs of lahour and materials. Then came the slump years of the late twenties and early thirties. The manufacturers say that, although between 1919 and 1932 the financial record of heavy electrical manufacturers as reflected in their dividend payments was better than it had been before the war, "it may be

* The manufacturers have, however, also pointed out that insofar as some of the United Kingdom manufacturers were offshoots of American and German concerns they were frequently given a free field to sell in the United Kingdom and in some instances in the British Empire.

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doubted whether it was such as to attract the new capital needed by a new and expanding industry. . . . After 1932 the industry acquired greater stability. It was some years, however, before greater prosperity showed its effects in distributed profits." From about 1910 some United Kingdom manufacturers had been seeking to export in competition with American and German manufacturers (see paragraphs 18 and 19). Referring to the world market, the manufacturers have told us that "after the 1914–18 war, and particularly during the slump of the late twenties . . . [they] . . . had the choice of taking orders at a loss or facing the greater loss entailed by empty shops". In these conditions informal discussions took place in 1930 between some American, British, German and Swiss manufacturers "to explore the possibility of making an agreement with the objects of obtaining statistical information and of raising the price level of heavy electrical machinery to an economic figure". As a result of this meeting the International Notification and Compensation Agreement was signed. In 1934 the agreement was superseded by the International Electrical Association, an unincorporated body operating similar arrangements. We describe these arrangements and the organisation of the Association and its incorporated successor, The International Electrical Association Ltd. (IEA), in Chapter 4.

43. During the 1939–45 war United Kingdom manufacturers continued to make electrical machinery, but they also made service equipment including radar and aircraft. After the war they found themselves with full order books, while most countries of the world, including the United Kingdom, were short of electrical plant. We have described the control of materials and machinery production and the allocation of priorities between the demands of the home and of export markets during and immediately after the war in paragraphs 22 to 27.

CHAPTER 2. THE BRITISH ELECTRICAL AND ALLIED MANUFACTURERS' ASSOCIATION

(1) Objects; Membership; Organisation

44. The British Electrical and Allied Manufacturers' Association Incorporated (BEAMA) is the successor of the National Electrical Manufacturers' Association (NEMA), a body founded in 1902 mainly by manufacturers and traders whose interests lay in the lighter engineering products, although manufacturers concerned with heavier plant were also members. We have described in paragraph 41 the general conditions prevailing when the NEMA was formed. The BEAMA is a company limited by guarantee and may not distribute any profits.

45. The principal object of the BEAMA as set out in the company's Memorandum of Association is to promote and protect the interests of electrical manufacturers and others dealing in or supplying electrical goods in the United Kingdom. It is the Association's primary aim to secure the co-operation of every concern in the electrical and allied industries so that it can speak for the whole of those industries on all matters affecting them. The interests of the BEAMA extend considerably beyond machinery the subject of the present inquiry.

46. The Articles provide that membership of the Association is open to "*bona fide* manufacturers in the electrical or allied industries within the British Empire": in practice membership has been confined to manufacturers within the United Kingdom. Admission is by 80 per cent. majority

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vote of the Council (the governing body) of the BEAMA. The Association has told us that "the considerations which the Council now bear in mind when reviewing an application are as follows:"

(i) "that the Company is under British control;"

(ii) "that the standard of the Company's products is consistent with the high reputation of the Association and its members;"

(iii) "that the Company's financial status is sound;"

(iv) "that the Company is engaged in manufacturing and is of general good repute in the industry."

In the years 1948-53 104 applications for membership were received, of which 89 were successful. Since the formation of the BEAMA's predecessor organisation in 1902, membership has grown from 29 to some 400; of this total, 58 concerns make machinery and plant covered by our inquiry. Members pay an annual subscription, based on the manufacturing wages paid yearly in connection with products within the scope of the BEAMA's activities and ranging from a minimum of £20 to a maximum of £3,500. The Articles of Association provide also for an entrance fee of 10 guineas, but this has not in practice been charged since 1937. In 1952 eight members, all of them manufacturers of machinery within the reference, paid the maximum subscription then ruling, while some 120 members paid the minimum. The voting power of members is related to the amount of their annual subscription. Between 1937 and 1953 the Association's annual income from subscriptions increased from £12,515 to £51,408.

47. The BEAMA is divided into Sections by type of product, and members of the Association normally belong to the Sections dealing with their products. Each Section deals with the technical problems relating to the particular type of machine with which it is concerned, and with such matters as conditions of contract, standardisation, transport of heavy loads, exhibitions, or the availability of materials insofar as these are concerned with specific products; the Sections do not deal with the determination of selling or buying prices. There are 32 BEAMA Sections, of which eight are concerned with machinery within our terms of reference.

48. The management and control of the business and affairs of the BEAMA are vested in a Council comprising representatives from 24 member companies elected from candidates nominated by the Sections and by the Council itself, with power to co-opt up to ten additional members: it is normal to co-opt the full number permitted in order to ensure that the interests of each Section are covered. Of the 34 Council members for the year 1955-56 16 are representatives of manufacturers of machinery within the scope of our inquiry, although nearly all of these make other goods as well. The Council controls and guides the affairs of the Association through a number of specialist committees.* There are also ten Overseas Committees whose main object is "to foster British prestige and increase the

* Namely:—

Council Committees:

Emergency;
Export Policy;
Finance;
Membership;
Monopolies (Inquiry);
Production;
Research.

Other Specialist Committees reporting direct to the Council:

Contract Conditions;
Education;
Electric Welding Industry;
Export Panel;
Fuel Efficiency;
Publicity;
Materials;
Mining and Flameproof Enclosure;
Standardization;
Taxation;
Traffic;
Electricity Development.

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volume of imports from the United Kingdom" in the territories concerned. They deal only with the same kind of matters as the Council itself. Discussion of matters affecting exports takes place in the BEAMA Export Panel, the members of which are chosen for their personal knowledge of overseas markets and conditions. In addition, the BEAMA is represented on the Overseas Policy Committee of The Federation of British Industries and on other bodies in the United Kingdom and overseas concerned with export trade; and it has also played a large part in founding and operating the Electrical Industry Export Service which provides information about exports to its members, who need not be members of the BEAMA itself.

49. The administration of the BEAMA is under the control of a Director and a Secretary appointed by the Council and invested "with such powers as the Council may think expedient". The Association employs a staff of about 200. Each Section and Committee has a Secretary who acts *inter alia* as a channel for general information, both commercial and technical, collected and collated within the BEAMA for dissemination to the Sections. The BEAMA also provides accommodation and secretarial services for the Groups and for certain allied trade associations, the cost being met by the bodies concerned. Group agreements covering similar or related machinery are administered by one Secretary who is usually also Secretary of the corresponding BEAMA Section. The BEAMA has told us that "by long experience, this method of operation has been found to be the best and most economical, ensuring that the staff allocated to any particular Section of the work are specialists . . . ": "were it necessary for each Trade Group to provide its own secretarial services, the charge on industry would be out of all proportion to the work entailed . . .". We describe the relationship between the BEAMA and the Groups further in Chapter 3.

50. In 1953 the BEAMA had a total income, including membership subscriptions and contributions to administration costs by Groups and other bodies, of £200,178: expenditure totalled £199,997, of which £169,390 represented salaries and administration costs (including those incurred on behalf of Groups and others) and taxation and £30,607* subscriptions and donations to research and other bodies.

(2) General Activities of the BEAMA

51. The BEAMA itself has described its main functions as:

(i) "To assist the Government by the provision of statistics and information thereby facilitating its negotiations in the national interest."

(ii) "To act as a mouthpiece for the electrical industry in negotiations with Government departments."

(iii) "To direct to all appropriate members, enquiries for electrical and allied equipment received from overseas purchasers who are unaware of the names of British makers."

(iv) "To maintain liaison with other industries, nationalised undertakings and other Trade Associations, on all matters of common interest."

(v) "To provide a forum for discussion on all matters of general interest to the industry; for example, Contract Conditions, Research, Standardisation, Publicity, Education and Training, just to name a few."

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* This sum was distributed as follows:—

To The Electrical Research Association	£21,297
To British Standards Institution	£2,450
To Others	£6,860

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52. Some idea of the scope of the BEAMA's principal interests and activities can be gained from the titles of the various Council Committees (see footnote to paragraph 48); these by themselves, however, do not give a complete picture of the many spheres in which these interests are pursued through the Association's membership of Government, professional, technical and commercial councils and committees in both the national and the international field.* We have already referred in paragraphs 28 to 33 to the part played by the Asssociation in research and standardisation and we describe the BEAMA's work on conditions of contract in Chapter 5. It is relevant here to mention one other aspect of its many other activities, namely the close contact which has for many years existed between the Association and electricity supply authorities in the United Kingdom. This led to the formation of the BEAMA/IMEA† Joint Committee in 1921 and later to the constitution of a four-party committee consisting of representatives of the BEAMA, the IMEA, the power supply companies‡ and the Central Electricity Board, and more recently of the BEA/BEAMA Joint Committee with its sub-committees.§ Insofar as these matters are also of interest to the Groups and are directly relevant to our inquiry, some aspects of them are referred to again in greater detail in later chapters of our report.

CHAPTER 3. THE GROUPS

(1) General Description of the Groups and their Activities

53. We have described in paragraph 41 the conditions prevailing in the electrical industry in the early years of the present century when the first Groups were formed. These Groups are not and have never been formally incorporated bodies, and indeed it is not always entirely clear what constitutes an individual Group. Considered as a whole the Groups are concerned with the operation of a number of agreements, 37 of which relate wholly or in part to machinery and plant within the scope of this inquiry. Each agreement is concerned with a particular type of plant (e.g. transformers), or with plant of a particular type within a specified range of size or output (e.g. steam turbines of 300 to 11,000 kW) or for a particular purpose (e.g. electrical equipment for rolling mills); it may be concerned with the home market or with exports or with both. Since each agreement contains provisions for periodical meetings of the signatories and the general administration of the agreement by the signatories, each may be said to set up a separate Group. In practice, however, there are a number of cases where two agreements,

* The Association's Handbook for 1955–56 shows the BEAMA as being represented on more than 100 such councils and committees.

† That is the Incorporated Municipal Electrical Association, a body which existed to promote the interests of municipal supply undertakings.

‡ That is the privately owned, as distinct from the municipally owned, supply undertakings.

§ There are seven sub-committees dealing respectively with:—
General Conditions of Contract;
Contract Price Adjustment Clause and Formulae;
Turbo-Alternator Standardization;
Transformer Standardization;
Switchgear Standardization;
Quantity Buying Terms and Discounts;
Meters Technical.

Until January 1954 there were also two sub-committees (Nos. 5 and 7) dealing respectively with Transformer and Turbo-Alternator Prices, representation on which on the manufacturers' side was in effect a matter for the Groups concerned.

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though covering different kinds of arrangements (notification and prices—see paragraph 152), deal with the same types and range of machinery in the same territory and have identical signatories; in such cases the signatories do not as a rule hold separate meetings to transact business under the two agreements, so that to all intents and purposes there is one Group operating two agreements. In other cases the membership of two such agreements may be largely but not entirely common; and though the signatories of each agreement must then act as a separate Group for the purpose of any formal decisions, the joint membership will frequently meet and act as though it were a single Group. Furthermore separate Groups concerned respectively with home and export sales of the same type of machinery, or Groups concerned with types which have a special association one with another (e.g. turbines, alternators and condensing plant) sometimes hold joint meetings. Although, therefore, we refer throughout this report to the "Groups" in the aggregate, for the sake of clarity we discuss particular arrangements as those of the signatories of a specified agreement rather than of a particular Group.

54. All Group agreements were reviewed by the Groups between 1948 and 1951 in the light of the Monopolies and Restrictive Practices (Inquiry and Control) Act, 1948. They were subsequently revised and reissued, and the common provisions of these revised agreements, such as those relating to membership and administrative arrangements, are now similar or identical in form. As regards other provisions there is in the first place a broad division between agreements dealing with prices and agreements dealing with the notification of enquiries, though there are some which cover both kinds of arrangement. Apart from this distinction, there are considerable variations from agreement to agreement. Some of these arise from technical considerations peculiar to individual types of machine, but others are due to the fact that each agreement represents the policy of a particular set of signatories, and different sets of signatories do not always arrive at the same solution to similar problems.

55. Under the revised agreements new signatories are admitted on a majority vote of existing signatories; formerly a unanimous vote was required. Existing signatories have always required that applicants shall have demonstrated their ability to manufacture machinery of the type and range concerned to a standard of quality comparable to that of signatories. Subject to this the Groups have told us that membership is open to any *bona fide* manufacturer in the United Kingdom of the type of machinery concerned. Signatories may withdraw from an agreement on giving a stipulated period of notice, generally but not always six months; an agreement may be terminated by a prescribed majority of its signatories, ranging from 70 to 80 per cent. according to the agreement concerned.

56. With few exceptions the larger manufacturers for whom machinery covered by our reference is a major interest are all signatories of one or more of these agreements, though not necessarily of every agreement concerned with the types of machinery they make. Most of them are also members of the BEAMA. There are practically no United Kingdom manufacturers of machinery in class (*a*) who are not members of the appropriate Groups.* In the case of machinery in classes (*b*) and (*c*), however, there are a number of manufacturers, generally making a limited range of the smaller motors and transformers, who are not Group members; some of these

* One large manufacturer of machinery in this class does not however subscribe to all Group arrangements, while another company making steam condensing plant, but normally not other types of machinery within our terms of reference, is not now a member of the Condenser Group or the Condenser Section of the BEAMA. There is no current Group agreement relating to the supply of hydro-electric plant in the home market.

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non-Group concerns are members of the BEAMA, but others belong neither to the Groups nor to the BEAMA. Most of the non-Group manufacturers are small, but one of them is among the largest producers of machinery in class (*b*).

57. Nearly all agreements* as now drafted have as their expressed objects co-operation for the good of the industry and of the public, the encouragement of research and development, the establishment of reasonable conditions of contract, and the study of, and co-operation in meeting, market requirements; those agreements which include price arrangements also include among their objects that of stabilising prices at "a reasonable and economic" or "competitive" level.†

58. The main provisions of the agreements include all or some of the following arrangements:—

(i) *Notification*, that is the central notification by signatories of specified particulars of enquiries, and subsequently of orders, received for machinery or plant the subject matter of an agreement.‡ This information, or some part of it, is circulated among signatories and enables them to discuss relevant technical or commercial matters. Historically notification has preceded other forms of co-operation between manufacturers. The arrangement does not as a rule apply to the smaller machinery in classes (*b*) and (*c*).

(ii) *Compensation* (referred to under earlier texts of the agreements as "royalty"), that is the payment by the successful tenderer of a sum of money to be used to compensate other tenderers who are members of the Group for the expenses involved in tendering.

(iii) *Common minimum price*, that is a price for specified machinery or plant below which all signatories have agreed not to quote, except as otherwise provided by the agreement. The minimum is in practice normally the actual price quoted. This does not mean that the prices quoted by all signatories to an agreement in response to a particular enquiry will necessarily be identical. For some of the more complicated machinery they are in fact unlikely to be so, since the operating characteristics offered by the various signatories will differ and these technical differences will be reflected in price adjustments which are provided for in the agreement. If, however, all tendering signatories were to offer machines of identical performance (though not of identical design) their prices would also be identical unless any of them exercised their right to quote above the minimum. In the case of larger machinery which is supplied under contract this practice is often called "level tendering".

(iv) *Supplementary provisions* relating to such matters as uniform conditions of contract, main contractor's handling charges, discount and price maintenance on resale: in their general effect these provisions support the main price arrangements.§

59. The operation of all these arrangements in relation to machinery in each of the three classes is described more fully in later sections of our report. They differ in detail between the different types of machinery, but not greatly in general effect. The Groups' arrangements for notification and

* There are two agreements, one concerning equipment for rail and the other for road traction, which provide only for general consultation between their signatories.

† The Transformer Makers' Agreement, however, expresses this object as: "To secure economic prices based upon the costs of efficient producers".

‡ Subject to any specified exceptions under particular agreements.

§ But signatories have certain obligations with regard to contract conditions under some agreements which do not include price arrangements.

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common minimum prices together with such supplementary provisions as are relevant cover nearly all machinery within our terms of reference supplied in the home market; the exceptions are described in the chapters dealing with the individual classes. The arrangements for compensation apply only to class (*a*) and the larger machinery in class (*b*). The Groups' arrangements for exports cover a more limited field than those for the home market, the main differences being that:—

(i) the Groups have no arrangements for common minimum prices or compensation in relation to exports of the larger machinery and plant in class (*a*);

(ii) they have no arrangements of any kind relating to exports of certain large specialised machines in class (*b*), while their arrangements for other large machines in this class apply only to "indirect" exports (that is, roughly speaking, exports which have been ordered by persons in this country, see footnote* to table in paragraph 320).

Where exports are outside the scope of the Groups' arrangements, they are in most cases covered by the arrangements of The International Electrical Association Ltd. (IEA) (see Chapter 4).

60. The titles and subject matter of the Group agreements concerned with machinery in each of the three classes of our terms of reference, together with those of the IEA, are given in Appendix 4: the membership of the various agreements is shown in Appendix 3. The texts of the main clauses and provisions of two Group agreements (the large turbine notification and price agreements) are reproduced in Appendix 5. While no single agreement is in all ways typical of all Group agreements, these may be regarded as fairly illustrative of the type of document concerned.

(2) Organisation and Administration

61. The total administrative costs, including taxation, of the Groups concerned with machinery covered by our terms of reference amounted to £84,112 in 1952 and £91,687 in 1953. Approximately 65 per cent. of the total cost in each of the two years was on account of accommodation and staffing services. Each Group has its own administration fund formed by payments from its members, assessed in relation to either the value of orders received or, in the case of turbo alternator plant in class (*a*) and large machines in class (*b*), the capacity of the machinery ordered.* It is from these funds that each Group defrays the expenses incurred on its behalf by the BEAMA (see paragraphs 49 and 50).

62. The agreements are administered by representatives of the signatory companies in committee and general meetings and by secretaries responsible to them, the same Secretary normally serving a number of agreements concerned with similar or interrelated machinery. The Groups are housed and staffed by the BEAMA. The provisions of the agreements may now be altered by a stipulated majority which generally varies from 70 to 80 per cent. of the signatories:† resolutions on other matters are normally carried by a simple majority vote.‡

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* Exceptionally, signatories of the agreements concerned with traction equipment in class (*b*) make equal contributions to the cost of administration.

† In the case of agreements relating to machinery in classes (*b*) and (*c*) of our reference, where amendment relates to the price provisions of the agreement concerned the stipulated majority is based on signatories' turnover.

In the case of the Dynamo and Motor Agreement and the Dynamo and Motor (Export) Agreement, unanimous consent of all signatories is necessary to all changes other than changes affecting the price provisions.

‡ The class (*a*) agreements contain express voting provisions only for alteration of the agreement. In class (*b*) the agreements relating to marine motors and generators, alternators and large D.C. generators require a 75 per cent. majority for resolutions on matters other than alterations to the agreement.

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63. Most agreements* provide that if there is doubt whether a signatory has fulfilled his obligations, the Secretary shall have the right to scrutinise all relevant documents of that signatory in order to ascertain whether there has been a breach of the agreement. In cases where it is established that a breach has occurred, the Secretary is given power to direct the signatory to rectify his fault; if the signatory fails to do so, the matter is to be reported by the Secretary to other signatories.† If the offending signatory is not satisfied with the decision of his fellow signatories, or if he fails to rectify his fault when called upon by them to do so,‡ the matter becomes a case of dispute and may be referred to arbitration under procedure laid down.§

64. Most Group agreements embodying common minimum price arrangements set out penalties which can be imposed for breaches of their provisions. These take the form of fines up to a maximum in some cases of 25 per cent. of the selling price of the machine as correctly calculated under each agreement, in others of 20 per cent. of the selling price so calculated or three times the difference between the agreement price and the offending signatory's actual price, whichever is the greater:‖ some current agreements also provide penalties for breach of provisions other than price provisions.¶ Any fines imposed are either to be paid into the administration fund of the agreement concerned or distributed among the non-offending signatories. In recent years there have been no breaches under any of the agreements which have led to the imposition of penalties: some agreements provide that "where a breach has been inadvertently committed . . . the fine shall be wholly or partially remitted", and the same principle appears in practice to have been applied by other Groups.

65. A number of agreements also provide that "if the membership of any signatory is in the opinion of the other signatories detrimental to the successful working of this agreement such signatory after being heard in his defence may be expelled by the unanimous resolution of the other signatories". The only recorded case of the application of this provision occurred when a transformer maker, after giving notice of withdrawal in July, 1953, was expelled from the Transformer Makers' Agreement for failing to observe fully his price maintenance obligations during the period of notice.

(3) Relation of the Groups to the BEAMA

66. We have referred earlier to the arrangements whereby the BEAMA provides accommodation and secretarial services for the Groups. We have

* That is, all agreements except the ship propulsion agreement and the agreements concerned with traction equipment.

† Procedure varies as between individual agreements: the Secretary's report is made to all signatories, to the signatories who tendered for the contract concerned, or to a committee appointed by the signatories, as specified under each. Under the Dynamo and Motor Agreement, the Secretary's findings are reported to other signatories concerned: that is, the Secretary does not himself in the first place instruct the offending signatory to rectify his fault.

‡ This second proviso is expressly stated only in the case of agreements embodying common minimum price arrangements.

§ Besides the exceptions mentioned in footnote * above, the Marine Motor and Generator Agreement contains no arbitration provisions, but provides that where a breach is committed "in respect of prices, other signatories are allowed to reduce their prices to the same level".

‖ Under agreements relating to steam turbines and allied plant in class (a), a fine up to a maximum of 25 per cent. of the "total correct price" is payable where the offending signatory accepts or fulfils the order; if he loses the order, he is liable to a fine up to a maximum of £100. Under these agreements a signatory supplying the turbine and also the alternator or condenser for use therewith and deemed to have infringed any one of the three relevant price agreements, may in some circumstances be deemed also to have infringed the others and may be held liable to a fine under each.

¶ By fine fixed by the other signatories, in some cases subject to a maximum of 20 per cent. of the value of the machinery concerned.

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also referred to the high degree of common membership between the BEAMA and the Groups: 58 of the 400 BEAMA members make machinery covered by the reference; 33 of these are signatories of one or more of the Group agreements concerned. The 25 BEAMA members who are not also members of one or more of the Groups are small concerns or have only a minor interest in these machines. There are also four signatories of certain Group agreements who are not members of the BEAMA. Before considering further the present relationship between these bodies, it is appropriate to give a brief account of their historical development.

67. The BEAMA has told us that as its membership expanded after the constitutional changes in 1911 (see paragraph 41), some members wished to co-operate more extensively in the regulation of prices and a number of Groups were formed for the purpose. By 1930 the BEAMA was supplying secretarial services and employing a large staff for the service of these Groups. In 1933 the Council of the BEAMA decided for convenience to set up a separate body, the Groups Joint Administration Board (GJAB), to administer the Groups' central administration fund and to assess the contribution due to it from each Group :* the GJAB also had the function of advising the Groups on matters of common commercial interest. The Board's four original members, the Chairmen of The British Thomson-Houston Co. Ltd. (BTH), The English Electric Co. Ltd. (English Electric), The General Electric Co. Ltd. (GEC), and Metropolitan-Vickers Electrical Co. Ltd. (Metro-Vick), were chosen because their companies had the widest range of membership in the Groups and consequently the most comprehensive knowledge of the Groups' affairs; they were later joined by the Chairman of a fifth company, C. A. Parsons & Co. Ltd (Parsons). The members of the GJAB have usually also been members of the BEAMA Council. In 1938 the GJAB appointed a General Manager, who was also appointed by the signatories of each Group agreement as General Manager for that agreement. The General Manager thereby took over certain responsibilities previously carried by the Director of the BEAMA: until 1938 the Director had been referred to in most Group agreements as the Secretary of the agreement and the accounts of some were still in his name.† The present General Manager also holds the appointment of Export Director of the BEAMA. Since 1944 the GJAB has delegated its routine duties to a committee (the Groups Joint Administration Committee—GJAC) consisting of representatives of the same five companies.

68. On a number of occasions in 1945, 1946 and 1947 the Council of the BEAMA considered the relationship between the Association and the Groups, and in 1947 certain constitutional and administrative changes were made. In the first place the Memorandum of Association of the BEAMA was amended with the intention of enabling it to co-operate with trade unions ;‡ this amendment was introduced because it was thought that

* A BEAMA and GJAB joint reserve fund was also created, the money being placed in a separate bank account which was at the disposition of the GJAB, although no part of it could be spent without approval of the BEAMA Council.

† The provisions of the agreements concerned were brought into line with those of other Group agreements in 1938.

‡ Paragraph 3 (V) of the Memorandum of Association lays down that it is one of the objects of the BEAMA "to do all such other lawful things as are incidental or conducive to the attainment" of the objects earlier specified, "provided that the Association shall not impose on its members or support with its funds or otherwise, or attempt to procure the observance by its members of any regulation or restriction which, if an object of the Association, would make it a trade union".

Paragraph 3 (M), as amended in 1947, lays down that it is an object of the Association: "To co-operate with any associations, incorporated or not incorporated, with objects altogether or in part similar to those of the Association, and which may prohibit the payment of dividend or profit to their members, at least to as great an extent as such payment to the members of this Association is prohibited by this Memorandum". (The BEAMA itself may not distribute any profits—see paragraph 44).

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the Groups might be trade unions in law, while the Electrical Fair Trading Council—a body whose members are concerned with products outside the scope of the present inquiry and with which the BEAMA was in fact co-operating on certain matters—was registered as such.* In the second place the Council on the advice of the Association's auditors† unified the Groups' administration accounts with those of the BEAMA, leaving the Groups to deal with any other financial business themselves; this action further reduced the functions of the GJAB which was, however, kept in being to advise the Groups on matters of general policy. In practice such general advice as the Groups are given now emanates from the GJAC rather than the GJAB.

69. In evidence to us the BEAMA has emphasised that the Groups are autonomous bodies, and that they do not receive recommendations on policy from or come under the control of the BEAMA Council. The BEAMA has also said that while it "is concerned with fair trading as between individual buyer and seller (e.g. contract conditions) and with a code of conduct and ethics which will maintain the prestige of the electrical manufacturing industry" and speaks for the industry as a whole on such matters, it is precluded by its constitution from regulating or discussing selling prices.‡ The Association has pointed out that the BEAMA Catalogue, which has a wide circulation, contains a note explaining that this limitation of function "has resulted in member-firms interested in the manufacture of particular products organizing themselves into autonomous Trade Groups which deal with matters outside the scope of the BEAMA. These matters may include codes of trade practice and the establishment of fair prices."

70. The evidence submitted to us and the records of the various bodies concerned which we have examined show that where, as in the case of contract conditions, the BEAMA and the Groups have a common—though not necessarily identical—interest, the Groups individually decide how far they will adopt any recommendations made to them, although at the same time the GJAC tries to ensure that their general policy in such matters shall be as uniform as possible. We accept the BEAMA's statement that it is not itself concerned with the operation of arrangements for notification, compensation and common minimum prices to which we have referred earlier in this chapter. There have been occasions, nevertheless, when the Association has been indirectly concerned with some aspects of these arrangements.

71. Thus on several occasions between 1946 and 1951 the BEAMA Council discussed complaints by overseas Governments and others about the practice of certain United Kingdom electrical manufacturers in quoting common prices: and discussions on similar matters have taken place in the Export Panel of the BEAMA. The Association has explained to us that complainants approach the BEAMA because it is the only body of which they are aware. We are told that, although in reply to such complaints the

* In law, a trade union is any combination which has for its principal objects one or more of the following: (i) the regulation of relations between workmen and masters or between workmen or between masters; (ii) the imposition of restrictive conditions on the conduct of any trade or business; (iii) the provision of benefits to members.

Under Section 6 of the Trade Union Act of 1871 a trade union may be registered with the Registrar of Friendly Societies. Registration does not confer trade union status, but provides evidence that a trade union is a trade union in law.

† Following their audit of the BEAMA accounts for 1946, the auditors drew attention to the fact that the BEAMA annual accounts did not show the whole of the expenditure for which the Association was contractually liable, and that certain funds in which it had a direct interest were not shown as assets in the balance sheet. The BEAMA has told us that a further reason for unifying the accounts of the Groups with those of the BEAMA "was the decision to act on the recommendations of the Cohen Report which ultimately led to the Companies Act of 1948".

‡ By Article 3 (V) of the Memorandum of Association—see footnote to paragraph 68.

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Association has submitted memoranda justifying the principle of common prices, the memoranda were actually prepared on behalf of the GJAB by certain specific Groups, so that the BEAMA acted only as a post office. The complaints themselves are considered further in Chapter 31.

72. In Chapters 9 and 26 of our report we describe the course of negotiations between the Central Electricity Authority (CEA) and the manufacturers about prices of steam driven generating plant and transformers. It is relevant to note here that the Joint Committees set up in 1949 to discuss such matters were initially known as BEA/BEAMA Price Sub-Committees although the manufacturers concerned in fact represented the appropriate Groups.* Moreover, in 1950 when negotiations within these committees had reached a stalemate, and again in 1952 when misunderstanding had arisen on certain detailed price increases for turbo alternator plant, the Director of the BEAMA helped to bring the parties together for further discussions (see paragraphs 210 and 219).

73. We are aware of two other cases in which the BEAMA has acted on behalf of or instead of particular Groups in matters connected with price arrangements. In the first the Condenser Section of the BEAMA in 1929 entered into an agreement with the Condenser Plate Association providing for rebates to its members on plates supplied for export land contracts. The BEAMA has said that in this case Section members were acting as a Group before the Condenser Group as such had been formed ; similar arrangements today would be properly a matter for the Group concerned. We have since been told that the agreement has been terminated. In the second case the Association in 1943 signed on behalf of the members of the Group concerned an agreement with the Ministry of Supply relating to the prices of a certain range of industrial motors and D.C. generators ; the agreement provided that quotations should be strictly in accordance with the price schedules of the Group agreement and set out the discounts applicable. The BEAMA has told us that it acted in this way on this occasion because the Ministry was unwilling to enter into an agreement with the Group as an unincorporated body. The agreement was revised in 1950, and all negotiations and subsequent arrangements were between the Ministry and the Group.

74. In conclusion it seems fair to say that while the BEAMA on the one hand and the Groups on the other have each distinct functions, the existence of common members and of administrative and financial links between the two has sometimes resulted in an assumption on the part of outsiders that the name and authority of the BEAMA are lent to activities which are strictly a function of the Groups. In the light of the facts set out above it is hardly surprising that Group prices should often be regarded by purchasers and others, more particularly those overseas, as BEAMA prices, a confusion which has been apparent in evidence submitted to us and of which the BEAMA is itself aware.

CHAPTER 4. THE INTERNATIONAL ELECTRICAL ASSOCIATION LTD.

(1) Summary of Organisation and Current Arrangements

75. The International Electrical Association Ltd. (IEA), incorporated in the United Kingdom in 1945 as a private company, is the successor of the unincorporated International Electrical Association ; the latter was set up

* See footnote § to paragraph 52.

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in 1936 to administer arrangements arising from the International Notification and Compensation Agreement of 1930 (see paragraph 42).* We are concerned here with the British members of the IEA, all of whom are United Kingdom companies, with arrangements to which these members are parties, and also with the relationship between the British and foreign members. It was the British members who furnished evidence and arguments to us and references in this report to information given or points made by the IEA should be understood as referring to the British members only.

76. Like the BEAMA, the IEA has a number of Sections, each concerned with a particular type or range of machinery; and since some members of these Sections also adhere to agreements with provisions comparable in some respects with those of the Groups, there is a superficial resemblance here to the relationship between the BEAMA and the Groups. IEA Sections and agreements are both however administered by the one central body, which now has no other functions of any importance.† The Secretary of the Association is also Secretary of all the agreements. The IEA is concerned only with heavy plant, including certain of the larger machines in each of the three classes under inquiry; its principal interest is in the larger machinery in class (*a*) and its interest in class (*c*) is now little more than nominal. The governing body of the IEA is the Council of 12 members; at present six members are from the United Kingdom and the remaining six from Belgium, France, Germany, Italy, Sweden and Switzerland.‡

77. The objects of the IEA as set out in the Memorandum of Association include the following:—

> "(*a*) To provide for the acquisition of, and to collect and circulate among its Members information on all subjects and matters, and particularly such as relate to the electrical manufacturing and contracting industry, and . . . industries associated therewith, as may be calculated to interest or benefit, or to be to the advantage of the Association or its Members . . ."
>
> "(*c*) To provide a central office and secretarial staff for the use of Members . . . and for the purpose of carrying out the objects of the Association."

The general purpose of the IEA organisation as a whole was described more specifically by the Secretary in 1936 as being "to obtain more reasonable prices and better Conditions of Contract" for its members' products, an object which at that time was "slowly being achieved."

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* The origins and pre-war arrangements of the IEA are described in the United States Federal Trade Commission's report on International Electrical Equipment Cartels (1948). The report is primarily concerned with the arrangements of certain United States manufacturers of electrical machinery, including the IEA's arrangements in which they then participated. The IEA has told us that the historical facts given about the Association's development are substantially correct, but that the report also contains many inferences and deductions which are the opinions of the Federal Trade Commission.

† Before the war the IEA as such was concerned with international standards, but it has not resumed its activities in this field.

‡ The Council is elected annually by the Association in General Meeting. When all members in a country have between them more than four but less than 15 votes, they are entitled to one Council representative; when they have together 30 votes or more, they are entitled to a representative for every complete multiple of 15: for this purpose every member present has one vote for every Section to which he belongs.

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78. Of the 16 Sections, 12 are concerned with machinery within the scope of our inquiry :* membership of a Section provides the opportunity to discuss such matters of common interest as conditions of contract as well as market conditions generally.

79. Before the war the unincorporated Association operated separate series of notification and compensation agreements, each pair of agreements being related to machinery covered by one of its Sections. The provisions of these agreements were generally similar to those of the single International Notification and Compensation Agreement of 1930.

80. The 12 notification agreements dealing with machinery with which our report is concerned still operate, and there are few members, British or foreign, who do not subscribe to one or more of them. We reproduce the text of a typical agreement in Appendix 5. Except for the subject matter (see Appendix 4) the main provisions of all agreements are identical. Each agreement provides for the central notification of enquiries and orders received and for circulation of specified information to other notifying or tendering signatories, as appropriate. The arrangements are generally similar to those in the Groups' agreements; each agreement provides *inter alia* for scrutiny of relevant documents by the Secretary if there is doubt whether a signatory has complied with his obligations, and empowers the Secretary to direct the signatory concerned to rectify any fault. The agreements further provide for arbitration by the Secretary on questions of dispute or difference, and for expelling by unanimous vote of the other signatories any signatory who commits a wilful breach or whose continued membership "shall be, in the opinion of all the other members, detrimental to the successful working of the Agreement". This provision has never been invoked. The objects of each notification agreement are expressed as (i) "to provide a basis on which members may be brought together with a view to taking joint action for their own good and for the good of the Industry" and (ii) "to exchange information enabling statistical and other data to be collected". Whether or not notification of an enquiry leads to other forms of joint action, we are told that it is of value to signatories in that it gives "mutual knowledge as to who your competitors are".

81. The compensation agreements were suspended in 1942, after United Kingdom Government currency regulations had made it impossible to effect payments to foreign signatories. The Association has told us that they have

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* Sections concerned with machinery under reference are:—

1. Steam Turbine Section	Class (*a*)
2. Steam Turbine Driven Alternator Section	
3. Steam Condenser Section	
4. Water Turbine Section	
5. Water Turbine Driven Alternator Section	
6. Generator and Motor Section	Class (*b*)
7. Rotating Condenser Section	
8. Rotating Converting Plant Section	
9. Traction Section	
10. Hoisting Equipment Section	
11. Rolling Mill Equipment Section	
12. Transformer Section	Class (*c*)

The remaining Sections cover:—

13. Steam electric power house equipment;
14. Blowers and compressors;
15. Switchgear;
16. Rectifiers.

New Sections may be formed upon the application of two or more members, subject to authorisation of the council, when membership is open to any IEA member making the machinery concerned.

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since lapsed. They provided that on receipt of an order, and except in certain specified circumstances, the successful signatory paid to the Secretary the sum appropriate as compensation under the particular agreement, the sum being related to the capacity of the machine; this sum was divided one-tenth to the deposit fund of the agreement, the balance equally among the tendering signatories. To meet working expenses signatories of the compensation agreements also paid an administration charge similar to that applicable under the notication agreements. The total of these compensation and administration payments for the three year period 1937-39 was about £500,000.

82. Compensation under the compensation agreements had a twofold object. First it aimed at redistributing the burden of expense of seeking and developing enquiries and preparing tenders by engaging the successful party on cach contract to compensate the unsuccessful "so as to cover all the expenses in their efforts to seek and secure the business". The IEA has told us, however, that the rates of compensation were originally fixed arbitrarily and that it has no means of judging how the amounts paid to signatories compared with expenses actually incurred. Secondly, the IEA has said that compensation was intended to raise the level of world prices for electrical machinery and that the rates were fixed with this aim in view: when first fixed they represented roughly 7½ per cent. of United Kingdom prices.* The IEA has told us that when compensation was introduced, prices were low and manufacturers were not making a profit: that was why they entered into the agreement of 1930 and its successors. The Association had no means of knowing whether its members did in fact enhance their tendered prices to cover possible compensation payments, but in its view when the general level of prices was depressed no member could afford not to do so; even if he were willing to accept a loss to obtain work in such circumstances, he would be deterred from incurring the additional loss involved by paying out compensation without a corresponding price addition. The Association is convinced that compensation arrangements contributed to the increase in the world level of prices between 1933 and 1939.

83. We have described the provisions and aims of these superseded compensation agreements in some detail because it is possible that foreign members may wish to reintroduce such arrangements. Meanwhile a modified form of compensation is still operated between British members of the IEA for certain types of machinery for which those members also agree common minimum prices: in this form it is the counterpart of arrangements for compensation for tendering expenses under certain Group agreements and has no wider object. Not all price arrangements under the IEA include compensation: of the £150/200,000 now paid annually in compensation under the IEA, about 95 per cent. relates to steam turbine driven power plant where all business done is at agreed prices and compensation is obligatory.†

84. Except in isolated cases, only the British members of the IEA have made arrangements for common minimum prices.‡ The IEA now operates only one formal agreement expressly providing for the maintenance of

* The formulae for calculating compensation were revised in 1941. The monetary yield remained unchanged.but, being based on capacity of machine, the yield as a percentage of price dropped as the level of prices increased. The revised formulae are still used as the basis of calculation under current compensation arrangements (see paragraph 83), but the yield represents a percentage mucb smaller than 7½ per cent. of the price.

† Business done by British members represents by far the greatest proportion of total IEA business in steam driven plant. Only five foreign members are concerned within the IEA with any of the component types of machinery, and of these four are signatories of the relevant notification agreements; they do not participate in the price arrangements.

‡ Since 1945 Continental manufacturers have co-operated with British members on two enquiries for water turbines.

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common minimum prices on all enquiries notified, namely the Turbine Plant Export Agreement covering steam driven power plant of 11,000 kW capacity and above. As regards the other kinds of machinery with which the IEA is concerned, *ad hoc* price arrangements between members interested may follow notification of an individual enquiry under any of the notification agreements, but in practice this occurs only in the case of water driven power plant in class (*a*),* and rotating condensers and electric hoisting and rolling mill equipment in class (*b*).† The IEA was formerly also concerned with price arrangements for transformers, but this interest was transferred to the appropriate Group in 1943. The British members of the IEA have told us that where price arrangements are operated their primary object is to obtain fair prices by eliminating competition among United Kingdom manufacturers as far as possible; where British members meet competition from other manufacturers the price level is arranged to meet that competition, while still avoiding competition among themselves.

85. From time to time co-operation between members of the IEA has taken the form of "protection", that is an arrangement whereby, following notification, the members interested in an enquiry decide to place one or more of their number in a more favourable competitive position to secure that particular order than the other parties. In such cases the other parties concerned arrange to quote higher prices than the protected party, or less satisfactory technical performance or delivery dates, or else to refrain from quoting at all. Protection as practised within the IEA has not been related to wider quota or market sharing arrangements: it may or may not be linked to common minimum price arrangements. There have been 18‡ cases of protection since 1936-37, 16 of them in connection with water driven power plant in class (*a*): foreign members have participated in some cases (see paragraphs 287 and 288).

86. The IEA's interests cover all markets of the world. The domestic market of United Kingdom manufacturers is, however, excluded from the operation of the various agreements and arrangements described above as far as British members are concerned, and similarly the Belgian and French domestic markets are excluded as far as business done by Belgian and French members respectively is concerned.§ These territorial exemptions carry with them no undertaking or understanding either that members of other nationali-

* In 1945 four British members of the IEA concluded an informal Hydro-Electric Plant Arrangement (HEPA) which provides for mutual collaboration: collaboration may and in practice often does include collaboration on price. A fifth member joined in 1948.

† *Ad hoc* prices, when agreed, are related to the proposed selling prices of tendering signatories and not to price schedules (see in particular paragraphs 283 and 284). It follows that where only one signatory tenders on an enquiry the prices quoted will be his own.

‡ The Association has supplied us with particulars of 23 cases. Five of these, however, arise from price preference given to particular manufacturers over a period (see paragraph 196) rather than from protection arrangements for particular contracts as described above.

§ The domestic market of British members for this purpose comprises Great Britain, Northern Ireland, the Isle of Man, the Channel Islands and, except for hydro-electric plant under the Hydro-Electric Plant Arrangement, the Irish Republic. The Belgian domestic market comprises Belgium, the Belgian Congo and the other Benelux countries. The French domestic market comprises Metropolitan France (including Algeria and Corsica).

With one exception (the water turbine agreement) the IEA notification agreements cover machinery for use in all countries of the world, "provided that if all the Members domiciled in one and the same territory desire to be exempted from the obligations . . . in respect of Plant for use in their domestic territory" the Secretary of the IEA shall on application "grant the exemption and shall advise all the members . . ." The provisions of the Hydro-Electric Plant Arrangement and of the Turbine Plant Export Agreement expressly exclude the British home market and (in the case of the Turbine Plant Export Agreement) the Irish Republic. So far as the IEA is concerned the foreign members are mainly interested in water turbines, for which the British home market is limited and for which there are no parallel Group arrangements.

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ties will refrain from quoting in those markets or that if they quote they will have regard to price levels established by the home market manufacturers. The British members of the IEA are, of course, aware of the arrangements in the British home market; they have told us that they do not know how far similar arrangements may exist between manufacturers in other countries.

87. In 1936 the Secretary of the IEA described the most usual forms of co-operation between members as:—

(i) agreement on rejecting unfair or unreasonable terms of payment or unfair conditions of contract and demanding proper guarantees of payment;

(ii) supercharging to compensate unsuccessful members;

(iii) price arrangements;

(iv) arrangements to provide protection for individual members in suitable cases.

The IEA has told us that, with certain qualifications, this remains generally a fair description of the Association's activities: (i) in particular remains a main aim of all members. With regard to other forms of co-operation, the Association points out that price arrangements between manufacturers in different countries necessarily present serious practical difficulties particularly when the costs of members, both British and foreign, are influenced by widely differing rates of wages for labour, when rates of exchange are fluctuating and in the face of discriminatory tariffs. In these circumstances compensation without obligation as to price was adopted as a compromise in the past, and it has always been favoured by foreign members of the Association as a method of raising the general level of world prices when that level is, in the view of manufacturers, unduly depressed. The British members on the other hand have generally preferred common minimum price arrangements and they would like agreement on prices with Continental manufacturers at the present time.* Under pre-war arrangements other forms of co-operation besides compensation were envisaged, but difficulty was always experienced in agreeing common price arrangements with the foreign members, who generally advocated some form of quota or protection on particular enquiries as an alternative. For their part the British members are not opposed to requests for protection arrangements from their foreign colleagues where a strong case is made out and provided that there is a *quid pro quo* in the form of protection in another market: they have told us that they always resisted the introduction of quota systems.

88. For some years during and immediately after the war the membership of the Association consisted almost exclusively of United Kingdom manufacturers. We are told that during this time "the British members adopted for their export trade the level price methods which were customary at home". More recently a number of foreign manufacturers have again joined: it is known that they "are very dissatisfied with the prevailing level of prices, and that they might be disposed to regard with favour arrangements which would raise prices above their present levels". Where tenderers from different countries are concerned level price arrangements are administratively difficult to operate, and we are told by the IEA that "there is a considerable presumption that Continental firms which wished to go beyond participation in notification agreements would prefer to revive the 'compensation' arrangements which formerly existed". It is expected that the growing number of foreign members will also lead to an increase in the

* The British members have pointed out to us that the main competitive markets for steam driven power plant are in Commonwealth countries, where foreign manufacturers would be at a disadvantage if they quoted prices level with those of United Kingdom manufacturers.

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frequency of requests for protection arrangements and possibly to a widening of the range of types of machinery to which requests relate.

(2) Membership

89. Under the Articles of Association of the IEA "only manufacturers and others concerned in the electrical industry and industries associated therewith" are eligible for membership: the Association in General Meeting has power to determine the conditions under which members may be elected. In practice if a non-member manufacturer presented serious competition to existing members those members would wish to bring that manufacturer into the Association provided that his products were of a sufficiently high standard of quality. If one Section agrees that the admission of a new member is desirable and the manufacturer concerned is willing, his admission to the Association and the Section follows automatically. No applications from non-members to join the Association have been refused; no United Kingdom manufacturers who have been invited to join have refused the invitation. Members do not necessarily join all the Sections relating to types of machinery which they manufacture.

90. Signatories of the notification agreements must be members of the corresponding IEA Sections, but not all Section members are signatories of the agreements. New signatories of the notification agreements are admitted by 75 per cent. majority vote of existing signatories "and under such conditions as they may prescribe". Although there is no provision to that effect, manufacturers making machinery of types covered by more than one notification agreement would, where the types are technically closely connected, be expected to join all the relevant agreements: thus a steam turbine builder who joined the Notification Agreement for Steam Turbines would be expected to join the Notification Agreement for Steam Turbine-Driven Alternating Current Generators as well if he were also an alternator maker. With this exception, there is no obligation upon a manufacturer joining one notification agreement to join all those concerned with machinery or plant of types which he makes. Moreover, a United Kingdom manufacturer with foreign connections may join an agreement, although the foreign parent or associate does not. No application from a Section member to join an agreement has been refused, but there have been cases where invitations from the existing signatories to join an agreement have been refused. There is no provision relating to the admission of new signatories to the only formal price agreement: neither is there any such provision under the informal Hydro-Electric Plant Arrangement. Existing members of the Sections may resign and signatories of the notification agreements may withdraw on due notice:* members may be expelled from the IEA itself by resolution of the Council.

91. There are 17 British and 23 foreign members of the IEA Sections concerned with machinery within our reference† (see Appendix 3). Of the British members, 16 are also signatories of at least one of the corresponding notification agreements, and most are signatories of all the agreements of the Sections to which they belong. Most are large concerns making a wide range of machinery. With one exception all 16 are also members of the BEAMA and the Groups, and they include the five manufacturers whose wide interests in Group arrangements have led to their representation on the Groups Joint Administration Board (see paragraph 67). The 23 foreign

* One year, to expire at 31st March, 30th June, 30th September or 31st December.

† There are 25 British members of IEA Sections, but of these eight are members only of Sections covering machinery outside our reference. All the foreign members belong to Sections covering machinery within the reference.

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members are Swiss (five), French (four), German (four), Italian (four), Swedish (three), Austrian (one), Belgian (one) and Finnish (one) manufacturers. Their interest is very largely concentrated in those Sections and agreements relating to water turbines and water turbine driven alternators.* Nearly all the foreign members joined, or rejoined, the Sections and agreements to which they now belong in or after 1954. In 1939 the Sections covering machinery within the scope of the reference had 37 members from five European countries (including the United Kingdom) and the United States; between the outbreak of war in 1939 and 1947 all but three of the non-British members either were suspended† or withdrew. For some years therefore membership was practically confined to United Kingdom manufacturers and the international character of the Association was maintained only through the participation of two Swiss manufacturers and one Swedish manufacturer in the Water Turbine Section and the Notification Agreement for Water Turbines. The present membership of the IEA does not include all the electrical machinery manufacturers in the world. Whether, for example, American and Japanese manufacturers will join in the future is, in the Association's view, "conjectural".

(3) Finance

92. Section members pay an annual subscription of £10 for each Section to which they belong. Signatories of the notification agreements pay a further annual subscription of £10 under each agreement: in addition under each notification agreement and under both the Turbine Plant Export Agreement and the Hydro-Electric Plant Arrangement the parties pay a sum on all orders received towards the cost of administering the agreement concerned. The Association's total income from these sources, from similar income under Sections and agreements concerned with machinery outside our inquiry and from income on investments amounted to £27,779 in 1937, rose to £43,115 in 1951, and thereafter declined to £31,331 in 1952 and £22,592 in 1953.‡ Of these totals, administration charges on orders for

* The following table summarises foreign members' participation in the IEA :—

Subject Matter	Ref. Class	Members of	
		Section	Notification Agreement
Steam Turbines	(*a*)	6	6
Steam Turbine Driven Alternators ...	(*a*)	7	6
Water Turbines	(*a*)	13	13
Water Turbine Driven Alternators ...	(*a*)	11	11
Generators and Motors	(*b*)	1	—
Rotating Condensers	(*b*)	1	—
Traction Equipment	(*b*)	2	2
Transformers	(*c*)	5	4

Of the 13 manufacturers concerned with water turbines within the IEA, ten belong to no other Section.

† That is, in the case of the German members.

‡ The 1953 figure included £6,510 for profit on sale of investments and income tax recovered.

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machinery within our terms of reference accounted for £27,302 in 1951, £20,200 in 1952 and £8,866 in 1953.

93. The Association's expenditure is mainly on salaries of staff administering its arrangements and related office expenses. It is the Association's aim that the account in total for any year should show neither a large surplus nor a large deficit. It does not keep separate expenditure accounts for each agreement but prepares estimates of the cost of operating each so that it can check the relation between income and expenditure: the following figures of estimated cost for agreements concerned with machinery in each of the three classes of our terms of reference show that the IEA's principal interest is in class (*a*):—

Class of Machinery	1951	1952	1953
	£	£	£
(a)	20,820	15,591	16,456
(b)	3,693	2,477	2,514
(c)	1,655	1,360	1,518

(4) Relationship between The International Electrical Association Ltd. and the BEAMA and the Groups

94. The IEA has no formal relationship with either the BEAMA or the Groups: it has its own offices and its staff is a separate and self-contained organisation. There is, however, a high degree of common membership in the case of United Kingdom manufacturers. As far as these members are concerned, the arrangements to which they subscribe under the IEA are complementary to their obligations under the Group agreements. Where both organisations are interested in the same type and range of machinery, each has its own system of notification: the two systems overlap one another only in the case of relatively few types and sizes of machine. The Groups have told us that their own arrangements are necessary because their records must be comprehensive, while the IEA regards notification as the starting point for other forms of co-operation and retained its arrangements during and after the war as a framework on which to build when foreign manufacturers rejoined. There is no overlapping between the organisations where compensation or price arrangements are concerned. In the case of steam driven machinery for land use in class (*a*), the IEA is responsible for British members' export price arrangements for machines of 11,000 kW capacity and above, which are priced by reference to the price agreements of Groups covering corresponding machinery in the United Kingdom market; but the Groups are responsible for export as well as home price arrangements for machinery from 300 kW and up to 11,000 kW capacity. The relationship between the IEA and the Groups is closest for these types of machinery, and the Turbine Plant Export Agreement is really an adaptation of the home agreement to export purposes. Apart from this agreement, prices are agreed *ad hoc* in the IEA on particular enquiries for water turbines and their associated alternators in class (*a*) and for certain machinery in class (*b*) such as rolling mill equipment and hoisting equipment. We have referred earlier to the fact that arrangements for pricing transformers for export were by mutual consent transferred from the IEA to the Groups (see paragraph 84).

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CHAPTER 5. CONTRACT CONDITIONS

(1) Model Conditions for Standard Contracts

95. The BEAMA has told us that one of the reasons for forming the Association* "was the lack of Standard Conditions of Sale and Contract . . . which being fair to both parties, and as such generally acceptable, would prevent customers from playing off one manufacturer against another": the drafting of such conditions for members' use was one of the first tasks undertaken. By 1908 the Association was working with the Institution of Electrical Engineers (IEE) on the preparation of conditions which would be acceptable to both manufacturers and buyers. In the years which followed each body issued its own set of conditions. In 1914 a mutually agreed text was put into operation and was generally adopted by municipal authorities and other large buyers: at the same time the BEAMA Conditions of Sale and Contract were extended and reissued. In the years between 1918 and 1939 the task of expressing in contract conditions the proper requirements of contractors and purchasers became increasingly a function of the IEE, in which it was joined after the 1939–45 war by the Institution of Mechanical Engineers (IMechE); the BEAMA has throughout continued to play an active part on the appropriate committees of the two professional institutions.

96. The BEAMA issues to its members a document usually called the "Brown Book" containing *inter alia*:—

(i) Five specimen sets of conditions of sale and three sets of conditions applicable to repair contracts, drawn up by the BEAMA; these constitute "the BEAMA Conditions".

(ii) Four model forms of general conditions of contract drawn up by the IEE; these constitute the IEE (or IMechE/IEE) Conditions. They are revised every four or five years, the BEAMA being represented on the appropriate committees.

(iii) Supplementary clauses of both the BEAMA and the IEE relating to adjustment of contract price in the light of variations in costs between date of tender and date of completion of the contract (the contract price adjustment, or "c.p.a." clauses).

(iv) An "Instruction to Members as to their obligations in the use of Conditions of Sale and Contract".

97. Leaving on one side the BEAMA Conditions relating to repair contracts, there are thus two alternative sets, one BEAMA and one IEE. Each set has forms applicable to each of the main types of transaction: that is, to contracts with or without erection, at home or overseas. All sets of conditions include (in so far as is appropriate to the type of contract) provisions relating to such matters as the supply of drawings and responsibility for their accuracy, testing, extra cost where suspension of work is due to the purchaser's action, indemnity of the purchaser in cases of action for patent infringement, liability for accidents and damage, storage charges where the purchaser is unable to accept delivery when due, arbitration, access to site, and responsibility for the provision on site of equipment and services: All sets which cover erection also include provision for terms of payment by purchaser to contractor during the course of a contract. The form and effect of these common provisions is not in all cases identical as between the corresponding BEAMA and IEE Conditions: moreover the IEE Conditions include a number of additional clauses, are more detailed, and anticipate a greater range of contingencies. The "Brown Book" comments, with

* That is the National Electrical Manufacturers' Association, the predecessor of the BEAMA.

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reference to the alternative conditions applicable to home market sales with erection, that the "BEAMA Conditions . . . are in some respects more favourable to members than the IEE Conditions . . ."* We are told by the BEAMA that its members "tend more and more to use the Institution's Conditions on important contracts, while the Association's own shorter conditions are in the main used on less complex transactions".

98. In addition to the standard model conditions referred to above, the BEAMA has negotiated with certain large buyers, including the Central Electricity Authority (CEA), modified sets of conditions for use in contracts placed with or on behalf of those buyers: conditions negotiated in this way for use in sales to the CEA and the Area Boards and based on the appropriate IEE Conditions, are included in the "Brown Book". United Kingdom Government Departments have their own Standard Conditions of Contract.

(2) Obligations of Members of the BEAMA, the Groups and the International Electrical Association Ltd.

99. In 1954 the Standing Rules of the BEAMA stipulated† that "members shall use the Association's Conditions of Sale or I.Mech.E./I.E.E. or the I.E.E. General Conditions of Contract in the manner set out in the 'Instruction to Members' in force for the time being, with the exception that with the approval of the Council any Section may, if it considers none of the above Conditions is applicable, adopt such Conditions of Sale as may be agreed by the Section". The text of the "Instruction to Members" imposes the following formal obligations on members of the BEAMA in respect of home market‡ sales to any purchaser "other than a Government":—

(i) When tendering for contracts without erection members must put forward the appropriate BEAMA Conditions, provided that they may substitute the corresponding IEE Conditions if requested to do so by the purchaser. In general no order or contract may be accepted on conditions less favourable to the member than the BEAMA Conditions.

(ii) When tendering for contracts with erection, and when no general conditions or only an abridged set is issued with the enquiry, members must put forward the appropriate BEAMA Conditions; when a full set of conditions is issued, the tendering member may "at his option" put forward either the BEAMA or the IEE Conditions, "but he has no further option". No order or contract may be accepted on conditions less favourable to the member than the BEAMA Conditions.

With certain specified and defined exceptions to be applied in cases where at the request of the buyer the appropriate IEE Conditions are used, no modification or alteration of the standard terms is permissible without the approval of the Industrial Solicitor to the BEAMA.§

100. In February, 1955, we were told by the Association that the obligation on members was nominal; that "it is not an obligation which is imposed,

* In oral evidence the BEAMA has told us that the words "more suitable" might be more appropriate than "more favourable".

† In the Standing Rules of the Association for 1955–56 "Members' attention is drawn to the recommendations on Conditions of Sale set out in the Brown Book" (see paragraph 100).

‡ The "home market" comprises Great Britain, Northern Ireland, the Isle of Man and the Channel Islands and also the Irish Republic. The "Brown Book" obligations do not apply to "the business of any Department of a member for which there is no BEAMA Section".

§ The Instruction further states that approval of members' requests for variations will not be given by the Industrial Solicitor unless in his opinion the alternatives contain essential clauses which are reasonably equivalent to those in the appropriate IEE Conditions.

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nor is it a thing which is regarded as an obligation . . . It has never been enforced, it should be regarded as a recommendation and is regarded as a recommendation" by members. We have since been told that the Association has decided "to recognise the fact, in the Brown Book, by 'recommending' the use of standard conditions instead of making it obligatory".

101. Members of the BEAMA were and are under no obligation to include the supplementary clauses relating to contract price adjustment—although they are recommended to do so—or to use the model conditions applicable to repair contracts. Nor has the "Instruction to Members" placed any obligations on members with regard to the use of contract conditions on export sales: in this case the use of the appropriate model conditions has always been a recommendation only and we are told that the BEAMA recognised "that in export markets members must be free to meet foreign competition". In considering the comments and replies of the Association which are quoted in later parts of this chapter it should be borne in mind that the BEAMA is speaking for itself and does not take into account any obligations which may be accepted by members of the Groups.

102. In addition to any recommendation made to them as BEAMA members, those manufacturers who are members of the Groups—including the few who do not belong to the BEAMA—undertake certain obligations by virtue of that membership (see Chapters 11, 19 and 27). The interest of the Groups in contract conditions is twofold: they are concerned as is the BEAMA in resisting the imposition of provisions which they regard as unfair, unreasonable or inadequate, and they are also concerned that their members shall offer uniform conditions in conjunction with common minimum prices on any particular contract, thus further limiting the field within which one member can compete with another.

103. In the case of Group agreements relating to home market supplies the uniform conditions adopted are generally the standard conditions included in the "Brown Book", modified or supplemented according to any decisions which the Groups may take themselves. In the case of exports obligations under Group agreements vary as between machinery in the three classes of our reference. The differences appear, however, to be largely a matter of emphasis and, with varying degrees of insistence, all the export agreements bind their signatories to put forward one or both of the appropriate "Brown Book" sets of conditions, but leave them some latitude to accept terms proposed or modifications insisted upon by the purchaser where these can be agreed by all signatories concerned. A signatory would not in such cases be free to agree modifications or alternative terms individually. All Groups concerned with larger machinery, that is with machinery involving long contract periods whether for home or export, also make it obligatory on their members to include one of the "Brown Book" supplementary clauses providing for contract price adjustment (see paragraphs 114 to 123). Some also require their members to specify progress payments during manufacture (see paragraphs 108 to 112).

104. The interest in contract conditions of the British members of The International Electrical Association Ltd. (IEA) who operate price arrangements is similar to that of the Groups, although their arrangements are more flexible. There are no provisions relating to conditions of contract under any IEA agreement, and normally where a purchaser submits reasonable conditions these are accepted. Where the purchaser does not submit his own conditions, or where his conditions either as a whole or in part are for any reason considered unfair from the manufacturers' point of view, the British members concerned put forward the appropriate IEE Conditions.

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Whether the purchaser's conditions or those of the IEE are to form the basis of the contract, the British members of the IEA normally also include where appropriate clauses relating to progress payments during manufacture, as modified by the corresponding Groups, and contract price adjustment. The IEA is informed of changes in the BEAMA clause relating to contract price adjustment and in the related contract price adjustment formulae.

105. The IEA has told us that its foreign members would not accept in their entirety the standard conditions normally used by the British members; in particular their attitude on progress payments during manufacture and contract price adjustment sometimes differs from that of the British members (see paragraphs 112 and 120). The BEAMA on its side has told us that there are manufacturers in other countries who are prepared to accept contract conditions which the BEAMA does not think fair and reasonable.

106. In 1937 the IEA formulated its own conditions of contract with and without erection, but these are not now used. More recently, in March 1953, the United Nations Economic Commission for Europe (ECE) drew up a suggested set of international conditions for contracts without erection designed to facilitate inter-European trade in engineering plant by establishing a set of standard conditions corresponding as far as possible to existing practice in European countries and to the reasonable requirements of both contractors and purchasers. The ECE Conditions were accepted by representatives of a number of European countries, are accepted as fair basic provisions by both the British and foreign members of the IEA, and are reproduced in the BEAMA "Brown Book".

107. Those purchasers and buying agents both at home and abroad whose views we have obtained have in general expressed themselves as satisfied with the fairness as a whole to both parties of contract conditions offered and accepted by United Kingdom manufacturers; some have, however, been critical of individual provisions in those conditions, notably those concerning progress payments during manufacture and contract price adjustment. These criticisms and the provisions to which they relate are accordingly described in greater detail below.

(3) Terms of Payment and Progress Payments during Manufacture

108. Both sets of model conditions in the "Brown Book" lay down that in the case of contracts with erection payment of stated proportions of the contract price shall be made on delivery or shipment and at stated times thereafter.* In an explanatory memorandum dealing with the General Conditions of Contract for Home Sales with Erection the professional institutions also recommend that where contracts involve considerable expenditure before delivery, the conditions "may be modified to provide for progress payments to the Contractor in respect of plant in course of manufacture".

109. The obligations placed upon members of Groups vary as between large and small machinery and home and export contracts. Progress payments during manufacture are not appropriate to machinery where the contract period is relatively short and there are no heavy capital commitments; but in the case of large machinery in all three classes of our reference the Group agreements concerned generally extend the provisions of the "Brown Book" by laying down:—

(i) the minimum value of contracts to which progress payments shall apply (the minimum value has varied from time to time);

* Terms of payment under the BEAMA Conditions for home contracts other than for public authorities may be varied in certain limited respects.

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(ii) that certain proportions of the contract value shall be payable during the process of manufacture (that is before delivery to site or shipment) at specified stages.

The inclusion of these extended provisions is normally obligatory upon members of most Group agreements in tenders concerned with large machinery and applies equally to home and export contracts; hut there are exceptions in all classes and moreover, where signatories of export agreements so agree unanimously, variations of the provisions can he made on particular enquiries. Similar arrangements apply under the IEA agreements (see paragraph 104).

110. The BEAMA has told us that in the years following the war, the drive for exports "led to a rapidly mounting volume of contracts in hand which coupled with inflation created an urgent need for more capital. . . ." There were limits to the extent of hank loans if managements were to retain control of their affairs and "finally there was the urgent national need to "obtain foreign currency". At the same time delivery periods became "abnormally extended thus increasing the financial hurdens of the manufacturer". In the Association's view "this made it necessary to introduce Progress Terms of Payment as a broad policy governing long-term contracts" for all manufacturers whether or not they were memhers of Groups. At the end of 1947 "an attempt was therefore made to estahlish throughout the industry the practice of seeking progress payments on a standard scale of instalments". A number of Groups were already proposing that progress payments should form a standard provision in larger contracts: as a further step the Council agreed that the problem should be discussed with other interested parties including the Central Electricity Board (CEB) and its successor the CEA (then the BEA), and the agreed conditions of contract negotiated with the CEA do in fact recognise the principle of progress payments. "Firm instructions as to how and when progress payments should he required were adopted hy various BEAMA Sections in late 1947 or early 1948, because of Sir Stafford Cripps' instructions to the banks 'to observe the intention' of his memorandum to the Capital Issues Committee.* Raising new capital was practically impossihle, and hank borrowing was almost equally difficult, for many memher-firms. Progress payments were the only way out of a difficulty, as without fluid resources work would stop."

111. It proved difficult to set limits of contract value below which progress payments would not he required, since what is a small contract to a large concern may impose a considerable strain upon the resources of a smaller manufacturer; in general both the BEAMA and the Groups Joint Administration Committee (GJAC) have recommended that progress terms should be sought for contracts valued at £50,000 and ahove in the home and export markets, except that in certain overseas markets where the political and financial future appeared uncertain the recommended minimum was set at £25,000. Progress terms of payment aim at securing 60 per cent. of the contract price spread over the manufacturing period and not less than 80 per cent. by the time of shipment.

112. The BEAMA adds that after 1952 certain Continental manufacturers hegan offering to accept deferred terms; hy the spring of 1954 "terms of payment competition" had not become acute, but there had then heen "sufficient instances to make it obvious that the industry will, in the near future, have to consider returning to the previous practice of taking each contract on its merits". The IEA believes that Continental manufacturers generally stipulated progress terms of payment in the years immediately after the war; they then hegan to offer extended terms hut may have changed this policy recently owing to lack of financial backing from the

* Cmd. 6645, May, 1945.

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banks or their Governments. In September, 1955, the BEAMA told us that, although it still recommended its members to seek progress payments on the larger contracts, this was "not obligatory": in many export markets "it has been evident for some time, firstly that the customer could not raise money as cheaply as the British manufacturer, and secondly that in many cases he could not raise all he needed in time. Hence many of Britain's most important export contracts have been taken during the last two to three years on deferred terms." In the meantime, in March, 1955, the Groups covering the export of the smaller steam turbo alternator plant had increased the minimum contract value for which progress terms are mandatory from £50,000 to £100,000; in the following May the Group covering the export of transformers adopted a similar amendment.

113. The London purchasing agent of a Colonial mining company told us in 1953 that progress payments were required by British manufacturers but not by foreign manufacturers: this witness commented that it was not clear why the purchaser should be expected to finance the company during the manufacture of the equipment ordered, but that as this clause had become standard in the electrical industry's terms of contract it had to be accepted. The BEAMA replied to us that: "It is not true as a general statement that foreign firms do not require progress payments. As one weapon in the fight to regain a footing in markets lost during the war, undoubtedly some acted in this way—indeed the Germans started offering deferred payment terms unrequested—a practice which proved so embarrassing to British trade two or three years ago and also to the Germans themselves. In the inter-war years Continental concerns were much keener than the British about getting progress payments"

(4) Contract Price Adjustment

114. The provisions relating to contract price adjustment are contained in supplementary clauses in the "Brown Book" and do not form part of the main body of any set of standard conditions contained in that book.* The IEE clause, which is related only to home market sales with erection, provides that: "If, by reason of any rise or fall in the rates of wages payable to labour or in the cost of material or transport or of conforming to . . . [statutory and similar obligations] . . ., the cost to the Contractor of performing his obligations under the Contract shall be increased or reduced, the amount . . . shall be added to or deducted from the Contract Price . . .", except in so far as any increase incurred has been due to default or negligence of the contractor. The BEAMA itself sets out "standard" and "alternative" clauses for use in contracts for home market sales both with and without erection, and before September, 1955, the BEAMA Council recommended either as suitable for use by members in conjunction with the standard BEAMA or IEE Conditions of Sale or Contract: "while the actual Clause and the circumstances in which it shall be incorporated . . . are the subject of [BEAMA] Section rulings, it is recommended that one of these Clauses be used in all contracts, except those made directly with a British Government Department". The "standard" contract price adjustment clauses provide that: "The Contract Price [The price quoted†] is based on the cost of material, labour, transport, and of conforming to statutory obligations

* An explanatory memorandum to the IEE Conditions contains a note that: "A Clause dealing with variation in costs is practically universal at the present time and one has therefore been included. It is, however, conceivable that in the future conditions may become so stable as to make such a Clause unnecessary, and it therefore stands as a Supplementary Clause rather than as part of the main Conditions."

† Alternatives in square brackets are applicable in the case of sales without erection.

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ruling at the date of tender, and if between that date and the completion of the work [the date on which the goods are despatched*] variations, either by rise or fall, occur in these costs, the Contract Price [the price quoted*] shall be amended to provide for these variations". The BEAMA alternatives to these "standard" clauses are virtually the same as the IEE clause set out above. The BEAMA has told us that when it adopted the IEE clause, it also preserved the original BEAMA clause as being one to which members and their customers had become accustomed. The Association says that where the original BEAMA clause has been used and purchasers have justifiably objected that part of the delay was due to the contractor's own default, members have invariably been advised that any increases incurred during this delay should be disregarded and in such cases members have always accepted this recommendation; the Association adds that in fact the cases where delay has been due to causes within the contractor's control have been rare. More recently the Association has told us that it now no longer recommends the use of the standard clauses.

115. "In order to meet the views of some purchasers who have objected to clauses of a general nature", the BEAMA Council has approved formulae "to establish a basis for the application of the . . . Price Adjustment Clauses"; the Council recommends "that the appropriate Formulae be included with all tenders when applicable in the manner indicated . . .". The texts of these formulae are reproduced in Appendix 6: there are two, for (i) "electrical machinery" and (ii) "turbo-generating and allied plant". Each sets out the corrections (in most cases a percentage figure†) to be made to the contract price for each 1 per cent. variation in direct labour rates and materials costs (together taken as representing 85 per cent. of the total contract price) which may have occurred by the end of the first three-fifths of the contract period: a further adjustment is made for any variation in labour rates which may occur during the last two-fifths of the contract period. The variations are calculated by reference to the Board of Trade Price Indexes of Materials used in the Electrical Engineering Industry and the Mechanical Engineering Industry‡ (see also paragraph 119) and to wage rates agreed from time to time by the Engineering and Allied Employers' National Federation and published in the Ministry of Labour Gazette. For the purpose of the formulae "electrical machinery" covers machinery in classes (*b*) and (*c*) of our terms of reference, and "turbo-generating and allied plant" machinery in class (*a*). While the BEAMA Council strongly recommends that all claims for increases should be calculated in accordance with the appropriate formulae, "some latitude must be given to the member in the settlement of such claims; but any variation from the exact figure so calculated should closely approximate to the variation shown by the Formulae".

116. Clauses applicable to export sales and similar to the "standard" clauses for home market sales are also included in the "Brown Book" with the appropriate formulae, and a separate supplementary contract price adjustment clause is given for use with the ECE Conditions of Contract.§

117. As far as the BEAMA is concerned there is no obligation to use either the contract price adjustment clauses or the formulae. The Groups make it binding upon their members to include in all contracts for large

* Alternatives in square brackets are applicable in the case of sales without erection.

† Tubes for condensing and feed water heating plant are an exception.

‡ Except that figures for brass condenser tubes are obtained from the Metal Bulletin.

§ The "Brown Book" explains that this separate clause "is merely a combination of the alternative BEAMA Supplementary Clause . . . for use with Home Contracts and the BEAMA Formula for use in the export of electrical machinery, the latter being presented in an algebraical form familiar to Continental users".

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machinery for home market and export sales one of the appropriate clauses in accordance with the BEAMA Council's "Instruction to Members" and to calculate any adjustment due by means of the BEAMA formulae unless in special circumstances there is a unanimous decision to do otherwise; for small machinery, where the manufacturing period is relatively short and contracts do not normally include erection, firm prices may be quoted. The British members of the IEA also normally include these provisions where appropriate in tenders for contracts within the scope of that Association.

118. The adjustment of contract prices on a percentage basis instead of by assessing the merits of individual cases first operated in 1918, when it was applied to contracts for certain Government Departments. The method was discontinued in 1920 when "some measure of cost stability was attained". We are told by the BEAMA that "the initial reason" for reintroducing contract price adjustment after the outbreak of war in 1939 "was a 10 per cent rise in materials in September" that year. "Thereafter wages and materials rose continuously. Manufacturers also had to contend with very full order books and priorities which were imposed by the needs of war. They could not even estimate a delivery date in a large number of instances." Further they were in their turn subject to delays in delivery of materials. It became (in the BEAMA's words) "impossible for contractors to accept long-term contracts at fixed prices". In December, 1939, therefore the BEAMA "recommended its members to include in their larger tenders a clause providing for contract price variation in the event of rise or fall of costs".

119. In 1940 the BEAMA, in conjunction with the CEB, the Electricity Supply Joint Committee (representing the power companies)* and the Incorporated Municipal Electrical Association* devised a formula covering electrical and allied machinery and calculated to give "an average assessment of any increases in cost arising during the period of the contract" as the result of changes in prices of materials and wage rates. Throughout the war years changes in costs of materials were based on the Board of Trade Intermediate Products Index, which had followed sufficiently closely the price movements of the main engineering materials for several years previously. The BEAMA has emphasised to us "that this formula only affected 85 per cent of the contract price: the unaffected balance represented profit and unvarying on-costs". This basis was found to be inadequate after the war and eventually, in 1952, the CEA and the BEAMA jointly agreed that the single formula then existing should be replaced by the present two formulae and that instead of the Intermediate Products Index the new indexes for materials used in the electrical and mechanical engineering industries, published by the Board of Trade and based upon the 1948 Census of Production, should be used (see paragraph 115). We are told that the indexes were introduced in 1949 "but calculated back to 1945 especially so that the new c.p.a. formula could be applied retrospectively".

120. The BEAMA has told us that its methods of price adjustment have been adopted by other trades and also in the suggested set of international conditions of contract for the export of plant drawn up by the ECE (see paragraph 106). The IEA has told us that Continental manufacturers also stipulated for contract price adjustment in the years after the war, but more recently its British members have experienced increasing pressure to quote firm prices or to accept a ceiling to contract price adjustment: in the face of foreign competition, they are complying with such requests to an increasing extent, although not in the case of steam turbo generating plant. One

* See footnotes † and ‡ to paragraph 52.

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member has told us that British members would like to quote firm prices, but that with constantly rising wages they cannot see their way to do so: the Association has been told by some Continental manufacturers on the other hand that they have no more reason for contract price adjustment provisions because they face no immediate wage claims. The Association has also told us that a German manufacturer recently accepted a contract on the basis that contract price adjustment would operate downwards only.

121. The BEAMA price variation formulae have not been adopted as a method of adjustment for Government contracts. The method was very fully considered by the General Purposes Sub-Committee of the Contracts Co-ordinating Committee,* but was regarded as unsatisfactory and the Sub-Committee recommended that where firm prices could not be arranged, the price variation should be made on the merits of the case using the Government Standard Conditions as the basis.

122. We have received little general criticism from purchasers of machinery or their consultants about either the principle or the operation of contract price adjustment. We are told by the CEA that while it looks forward to a return to firm prices it recognises that in the case of turbo alternators such a change is necessarily far distant; this being so, it believes that the contract price adjustment formula applicable to this machinery "... by and large ... with a series of contracts, works out pretty fairly from both sides' point of view. ..." Other purchasers also say that they recognise that in the conditions which have prevailed during and since the war some adjustment may be inevitable on long term contracts. Where criticism has been offered it has been on the grounds that: (i) where through no fault of the purchaser delivery is delayed beyond the date specified in the contract, the buyer is both deprived of the use of the machinery and obliged to pay any increase in the contract price which may result from increased costs during the period of the delay; (ii) the inclusion of contract price adjustment provisions in export contracts reduces the United Kingdom manufacturer's ability to compete with foreign manufacturers, who have usually shown themselves more ready to quote firm prices; (iii) the use of a formula, though offering a practical method of settling a difficult problem, is inappropriate for large contracts or custom built plant; in these cases the method of adjusting prices by reference to the costing of individual contracts is preferable. The comments for the most part relate to the years up to 1953.

123. In considering these criticisms the following points should be borne in mind. Both the IEE and the BEAMA alternative contract price adjustment clauses preclude the operation of price adjustment where the contractor is responsible for delay, and in practice the BEAMA "standard" clauses were applied in the same way; further both the IMechE/IEE and the BEAMA General Conditions of Contract recognise that where the purchaser suffers loss by reason of late despatch or delivery, the manufacturer may under law be liable for a counter claim for damages.† In many cases delay has resulted from the fault or negligence of neither party, but from circumstances (for example, late delivery of materials or component parts bought in from sub-contractors, or labour disputes) which neither could control. The BEAMA itself has told us that where delivery or completion is delayed through no fault of the purchaser, adjustment of the contract price for the extended period is, in practice, a matter for mutual agreement between the

* A Committee under Treasury chairmanship comprising representatives of the major Government Departments conducting contract work.

† Where, however, delay is due to causes beyond the reasonable control of the contractor, the clauses provide that the contractor may claim an extension of his contract, when the purchaser's engineer "shall ... grant ... such extension ... as may be reasonable".

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individual manufacturer and purchaser.* The Association points out that "the production of tailor-made machinery is an art, involving the co-ordination of supplies of raw material, semi-finished and finished parts, sometimes running into some hundreds of thousands of separate items, in accordance with a time-table . . . Conditions . . . have gradually become more stable . . . Late delivery is now the exception for which there is usually a justifiable cause." The British members of the IEA confirm this statement and add that their delivery dates are now comparable with those offered by foreign manufacturers. With regard particularly to the second criticism mentioned in the previous paragraph, foreign manufacturers may in some cases have received some form of assistance from their Governments, whether by direct subsidy or by taxation relief, which was not available to manufacturers in this country. The BEAMA itself has replied to this criticism that "in many instances the member-firms tendering for specific contracts, especially for foreign markets, have agreed either to quote firm prices, or to set an upper limit to possible c.p.a. claims. Regard has still to be paid to the particular raw materials and processes involved in executing the contract. Foreign firms are not alone in taking such risks. This is usually done, however, to obtain an entry to a particular market, or because their Government has underwritten the risk as a matter of State policy." We think it relevant to point out here that whatever may be the advantages and disadvantages of firm prices as opposed to the use of an escalator clause, firm prices on long term contracts in fluctuating market conditions will almost inevitably be enhanced prices unless they are subsidized. Against the further alternative of adjustment on the merits of individual contracts it might be argued that this involves a considerable expenditure of time and effort and is more likely to prove contentious.

(5) Government Contracts

124. We have referred earlier to the fact that the conditions of contract reproduced in the "Brown Book" and adopted by members of the BEAMA, the Groups, and for some purposes the IEA, are not applicable to contracts for United Kingdom Government Departments; such contracts are governed by separate Standard Conditions adopted by the purchasing Departments. One of the Departments principally concerned has told us that while its relations with manufacturers are generally good, negotiations are sometimes protracted through manufacturers being unwilling to accept all the Standard Conditions of Government Contracts. Provisions mentioned by this Department are those relating to Default (No. 14);† Variation of Price (Nos. 44 to 47),‡ where it is said that "until about a year ago, when they started to quote 'firm' prices, it was common for members of BEAMA to attempt to secure the inclusion of the BEAMA price variation formulae in lieu of the standard price variation conditions"; Break (No. 56);§ Price Fixing

* It is also relevant to add that the delivery or completion dates quoted in a tender may not in many cases be firm or guaranteed dates.

† Clause 14 provides that, in the event of failure to deliver within the time specified, the purchasing Department may determine the contract either wholly or to the extent of the default. Any extra cost arising from such default may he claimed from the contractor.

‡ Clauses 44 to 47 provide that, if any increase or reduction in the price of lahour or materials used hy the contractor or sub-contractor occurs during the execution of the contract, the amount of the increased or reduced expenditure on these items shall he added to or deducted from the contract price. Overhead charges, profits, and any price variation attributahle to delay in the execution of the contract within the control of the contractor are excluded from the provisions of these clauses. The contractor must keep and furnish on request adequate records and accounts to verify claims under these clauses.

§ Clause 56 provides that the purchasing Department may determine the contract at any time by giving written notice to expire at the end of two weeks or of a period stipulated in the contract and specifies terms for winding up the work and indemnifying the contractors.

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(No. 43) and Costing (No. 54).* Another purchasing Department has made similar comments with regard to Costing and Variation of Price.

125. We are told by the BEAMA that these comments arise "mainly from the fact that Government Standard Conditions of Contract are framed in general terms to cover the purchase of any and every product from broomsticks to intricate machinery. It is only by judicious selection from the 50/60 clauses in the Conditions that an appropriate contract can be made. Manufacturers are reluctant to accept clauses inappropriate to their products or the circumstances of the transaction . . . The BEAMA would normally recommend acceptance of the clauses mentioned . . . with the exception of the costing clause No. 54." Those of the clauses concerned in these remarks which appear to be directly relevant to our inquiry are the price variation, price fixing and costing clauses: we have already discussed the first of these in (4) above as it applies to normal commercial contracts. It will be convenient to set out here the attitude of the BEAMA and the Groups to the price fixing and costing clauses.

126. The BEAMA says that it has consistently recommended its members to resist in the case of their "normal and standard products" the inclusion of a cost investigation clause which, from 1937, certain Departments sought to introduce into Government Departments' Standard Conditions of Contract. The BEAMA contends that in the case of such products it is possible for the Departments concerned "to obtain a check on prices by usual market means". The BEAMA has explained that a distinction was drawn between normal and special products because "for the development and manufacture of the former the maker was wholly and solely responsible, and upon its continued sale—subject to progressive development—did his future commercial success depend. Whatever standing such product had attained had been in the open market whether by price competition, technical merit, service, delivery or any combination of these . . . There was no logical reason why any buyer should obtain them on any basis other than the usual market appraisal": "cost investigation under these circumstances imposes an entirely unnecessary burden on the Industry and is a waste of public money". Special products on the other hand "almost always broke new ground", some being manufactured under development contracts,† so that a form of cost investigation was the only practicable method of arriving at a fair price: "there never has been opposition to the inclusion of this clause where products are in any way specialised or non-standard". The BEAMA members to whom the recommendation was made manufacture a wide range of products and not all these products are necessarily subject to arrangements similar to those of the Groups. A recommendation on this matter similar in effect to that issued by the BEAMA to its members was also issued by the GJAC to the Groups, which appear in most cases to have endorsed it. The Groups have told us that "Group members have never, so far as is known . . . resisted cost investigation on contracts for special service equipment".

127. The BEAMA adds that "after the war certain newly-nationalised bodies sought to attach to themselves the privileges which they imagined Government had enjoyed universally. Their purchases, however, were limited to the manufacturer's normal lines, and all attempts to impose in

* Clauses 43 and 54 provide that a fair and reasonable price shall be agreed between the purchasing Department and the contractor. In fixing this, the purchasing Department shall have the right to verify costs by reference to the books of the contractor and any sub-contractors during manufacture.

† In the case of machinery covered by our reference, the development contract is almost unknown.

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contracts standard Government Cost Investigation provisions have been resisted. This attitude has been adopted by certain BEAMA members acting in concert. Relatively few members are concerned in the main volume of nationalised-industry business, and the BEAMA Council as such has never proffered its advice." The nationalised bodies principally concerned are the CEA and the Area Boards as purchasers of power plant and transformers. Negotiations between the CEA and the manufacturers on these and other matters are described in Chapters 9 and 26.

(6) Terms and Conditions Specified by Purchasers

128. We have asked the BEAMA and the IEA whether purchasers still seek to impose terms and conditions which the manufacturers regard as unreasonable. We are told that they do: both Associations have furnished what they regard as examples from the conditions of Government Departments and nationalised industries at home and of Commonwealth and foreign Governments and supply authorities overseas. The BEAMA has prefaced its remarks by commenting that the commercial members of any concern, who actually make the contracts, are not generally legally trained and cannot be expected to know the "exact legal implications of the terms of such contracts. This is especially the case in contracts for the sale and/or erection of electrical apparatus (which involves technicalities of a professional order) to which more complex provisions are appropriate than to the sale of most merchandise. A particularly good example is the extremely onerous consequence entailed by the application of S. 14 (1) of the Sale of Goods Act* to apparatus of a complex nature, manufactured as economically as possible, in which a slight defect may occur in spite of all the precautions taken by a conscientious manufacturer. Even a slight defect may have the most serious consequence and it has been generally conceded by the most careful purchasers, both at home and abroad, that it would be unfair to make the manufacturer liable for the consequences of such 'inevitable' defects." While therefore some of the examples of onerous conditions given by the Association "may appear at first sight to be of little importance, they have far reaching implications which become apparent with careful study". The Association adds that "it is misleading to suppose that foreign purchasers seek to impose more onerous conditions than purchasers in the home market".

129. The majority of the examples given by the BEAMA relate to provisions which (i) grant no extension in contract time where delay is due to causes beyond the contractor's control, (ii) place responsibility for damage or defect on the contractor irrespective of whether or not such damage or defect is due to his negligence or causes within his control, or (iii) make no provision for arbitration but stipulate that any disputes shall be decided unilaterally by the purchaser. The BEAMA has quoted one case relating to erection contracts where objection is taken not so much to the onerous nature of the terms offered "as to the fact that they are unintelligible. They consist of a combination of the Conditions for supply and delivery . . . which are designed for use with all types of merchandise, with a set of Special Conditions governing the delivery and erection of mechanical and

* Section 14 (1) of the Sale of Goods Act, 1893, provides:

"(1) Where the buyer, expressly or by implication, makes known to the seller the particular purpose for which the goods are required, so as to show that the buyer relies on the seller's skill or judgment, and the goods are of a description which it is in the course of the seller's business to supply (whether he be the manufacturer or not), there is an implied condition that the goods shall be reasonably fit for such purpose . . ."

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electrical plant. The nomenclature used in the two sets differ, in some places they overlap without being consistent and important gaps are left." In another example cited by both the BEAMA and the IEA the standard conditions of the purchaser (a Commonwealth electricity supply undertaking) for turbo generating plant contained provisions that (i) the contractor must supply drawings for every part, which in effect would enable the purchaser himself to manufacture any part of the plant covered by the contract, and (ii) the contractor must obtain the purchaser's approval of every sub-contractor from whom the contractor obtains stock materials or minor components.* These two clauses were omitted from the "model conditions" applicable to contracts for this purchaser as finally agreed with the BEAMA but, in the BEAMA's words, the purchaser "was only induced to abandon" these "manifestly unfair conditions on manufacturers . . . as a result of stern, prolonged and *united* resistance" in negotiations lasting over many months; the Association considers it "doubtful whether a single manufacturer negotiating in isolation could have achieved this result". Other purchasers in the same territory insert a stipulation obliging the contractor to reveal the normal agency commission payable to his local representative.

130. The IEA has referred to a recent South American enquiry for hydro-electric plant where the conditions "specified that the Contractor was liable for unlimited consequential damages", and has quoted another case where the conditions put forward by the purchaser were so bad that not only the British and the foreign members of the Association, but also a number of non-member foreign manufacturers, reached common agreement that every party tendering would ask for certain amendments. The IEA has summed up its chief criticisms of purchasers' conditions by saying that there is a need "to clarify their ambiguity and to have inserted essential safeguards, such as independent arbitration and limitation of Contractor's liability".

* The IMechE/IEE Conditions for home contracts with erection provide that: "The Contractor shall not, without the consent in writing of the Engineer, which shall not be unreasonably withheld, sub-let the Contract or any part thereof, or make any sub-contract with any person or persons for the execution of any portion of the Works other than for materials, for minor details, or for any part of the Works of which the makers are named in the Contract". A similar provision is included in the IEE Conditions both for export delivery f.o.b. and for export contracts with erection.

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PART II—CLASS (a) OF THE TERMS OF REFERENCE TURBINES AND ALLIED PLANT AND MACHINERY

CHAPTER 6. THE BACKGROUND

(1) The Machinery

131. The machinery in class (*a*) of our reference falls into three main categories: steam turbines and related alternators with a continuous maximum rated output of not less than 300 kW for use on land and condensing and feed water heating plant associated therewith; similar steam driven machinery for marine use; and water turbines and water turbine driven alternators also with a continuous maximum rated output of not less than 300 kW. Our terms of reference under class (*a*) also include alternators of similar capacities designed to be driven by gas turbines, though not the gas turbine itself; the application of gas turbines in this field is, however, at present largely experimental. Class (*a*) does not include turbines used for mechanical as distinct from electrical drives, although steam turbines similar in type to those required for driving alternators may for example be used for driving blowers or compressors. Whether for use on land or at sea and whether required for public or private supply, the function of all machinery in the class is basically the same, namely the generation of electricity. The underlying principles of operation are also the same whether the motive force is steam or water, although designs differ very widely as between these two types.

132. The relative importance of each of the three categories in relation to each other and to the class as a whole may be assessed from the following table based on the value of manufacturers' net sales in the year 1952:—

Machinery	Home		Export		Total	
	£'000	Per cent.	£'000	Per cent.	£'000	Per cent.
Steam turbines and allied machinery for use on land	10,851	95·8	8,810	73·8	19,661	84·5
Marine	212*	1·9	9*	...	221	0·9
Hydro-electric	268	2·3	3,123	26·2	3,391	14·6
TOTAL	11,331	100	11,941	100	23,273	100

* Machinery sold for incorporation in larger units (e.g. ships or dredgers) and subsequently exported as part of the larger unit are shown as home market sales. Export figures relate to direct exports only.

133. The description of the machinery which follows is intended primarily as an aid to the understanding of matters relevant to our inquiry, more particularly the manufacturers' pricing arrangements described in Chapters 8 and 13, and is accordingly given in a layman's and not an engineer's terms.

134. The steam turbine, alternator, condensing and feed water heating plant, forming a "turbo alternator set", constitute the means by which the latent energy in coal, oil or other combustible fuels, transformed in the boiler house plant into heat energy contained in steam, is converted into electrical energy. Of the four component machines in the complete set, only the alternator is an electrical engineering product; the remainder are products

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of the mechanical engineering industry. The turbine is the key machine in the set; it provides the mechanical power required to drive the alternator; its performance depends on the efficient design and operation of the condensing plant and from it the steam required for the operation of the feed water heating plant is extracted. Some idea of the complexity of modern machines may be gained from the fact that in a turbo alternator set of 30 MW capacity there are approximately 160,000 parts weighing about 350 tons, and in a set of 60 MW capacity approximately 268,000 parts weighing about 650 tons.* Many of the sets now being built are still heavier and more complex.

135. The turbine consists essentially of a forged steel shaft (the rotor) which rotates within a cylindrical casing under pressure from steam which expands over a series of graduated blades as it passes from one end of the casing to the other. When no further expansion of the steam is possible and it has thus lost its driving power, the exhaust steam passes to the condenser where it is reconverted into water. There are two main types of turbine, the "impulse" machine and the "reaction" machine, the difference lying in the design and shape of the blading: in the "impulse" turbine the power is obtained from the force of the steam striking the moving blades, while in the "reaction" turbine it is also derived from the reaction of the moving blades to the force with which the steam leaves them. Both impulse and reaction turbines are usually designed as axial-flow machines, that is the flow of steam is parallel to the rotor. The Turbine Groups have told us that while the difference in design as between impulse and reaction turbines is fundamental, other and lesser differences in design are tending to diminish as the result of a "moderate amount of standardisation of output and of steam conditions", although there are still differences as between one manufacturer and another. They say that competition between Group members on design, quality and service is very real and has been intensified in the case of the latest very large machines required by the Central Electricity Authority (CEA); in such cases these matters are so vital that price may be a secondary consideration. In the Groups' view the turbines now built in this country, although not necessarily so large in capacity, are better technically than those built anywhere else in the world.

136. In a turbo alternator set the turbine rotor is coupled either directly or in the case of the smaller sets through reduction gearing to the alternator rotor, a forged steel shaft carrying a series of insulated copper windings which, when energised by direct current, set up a magnetic field. The alternator shaft is rotated within a cylindrical casing (the stator), usually of fabricated

* The Groups concerned have given us the following figures:—

	30 MW Set		60 MW Set	
	No. of parts	Weight Tons	No. of parts	Weight Tons
Steam turbine with oil coolers and oil pumps	50,000	146	54,000	205
Condensing plant, feed water heaters and auxiliaries	42,000	115	44,000	267
Alternator (30 MW—air cooled; 60 MW—hydrogen cooled)	68,000	88	170,000	174
TOTAL	160,000	349	268,000	646

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steel, on the inside of which is carried a further series of insulated copper windings in which an alternating current is generated by the rotary movement of the lines of force created by the magnetic field from the rotor windings. Direct current to excite the rotor windings is obtained from a small D.C. generator either directly coupled to or mounted on the rotor shaft of the alternator, or in some cases separately driven. To dissipate the heat produced by the process of generation in both stator and rotor windings, fans are mounted on the rotor shaft which circulate air or hydrogen throughout the interior of the machine.

137. There are two main types of condenser, namely surface condensers and jet condensers: more than 90 per cent. of all condensing plant made in this country, including all large units for power stations, is of the surface type. The condensed steam (condensate) is returned to the boiler, passing through the feed water heating plant when such plant forms part of the set. Feed water heating plant is installed in the interests of thermal efficiency to raise the temperature of the condensate after it has left the condensing plant and before it is returned to the boiler.

138. The efficiency of a turbo alternator set, measured in terms of steam consumed per unit of electricity sent out, depends partly on design and partly on the operating conditions (that is to say, steam pressure, steam temperature, vacuum or back pressure, and speed). It is broadly true to say that the overall efficiency of a steam turbine goes up as the output, speed, steam pressure and temperature are raised, though different machines designed for the same operating conditions may have different efficiencies. In the interests of improved efficiency development has primarily been directed to designing and building machines of increasing capacity operating at higher pressures, higher temperatures and greater speeds and, inevitably, of greater bulk. In the middle nineteen-twenties the average turbine driven alternator had an output of about 10 MW. After 1948 the CEA at first concentrated on machines with an output of 30 MW and 60 MW; it is now also commissioning sets of 100 MW and 120 MW and is concentrating increasingly on these and even larger sizes. Thirty years ago the average steam pressure employed was approximately 400 lbs. per sq. in. and the temperature was rarely above 600°F; to-day the CEA's 60 MW sets are designed to operate with steam at 900 lbs. per sq. in. and 900°F, and the latest sets ordered by the Authority are designed for an output of 200 MW using steam at 2,350 lbs. per sq. in. and 1050°F.* Forty years ago turbines of 1·5 MW capacity did not run at more than 1,500 r.p.m.; to-day machines of this size are running at speeds up to 15,000 r.p.m., while turbines of 120 MW capacity are running at 3,000 r.p.m. At this speed, the tips of the longest blades of the turbine are revolving at a speed approaching 1,000 m.p.h.

139. The design and construction of the modern turbo alternator set have necessitated the development of new metal alloys capable of withstanding greatly increased stresses and temperatures and of new techniques for making very heavy steel rotor forgings. In all these developments the power plant manufacturers have co-operated with the steel makers. The need to limit as far as possible the increase in the physical bulk of the machinery has been met by the development of hydrogen cooling and its adoption in place of air cooling on all machines of 60 MW and above. We are told by the manufacturers that as a result of these and other developments in design and construction, the guaranteed efficiency of the most up-to-date turbo

* The 200 MW sets are "reheat" sets—that is to say, the steam is reheated at an intermediate stage of its passage through the turbine.

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alternator sets at their most economical rating has risen from 29 per cent. in 1925 to over 41 per cent. for sets to be installed in 1956.*

140. Turbo alternator sets for marine use are generally similar to those for use on land, but are of lower capacity.

141. The fundamental principle of the water turbine is the same as that of the steam turbine, although the difference in motive force leads to a basic difference in design. Both the output and the speed of a water turbine depend upon the head and volume of water available: in no two installations are the conditions the same. Water turbine speeds generally are much lower than those of the steam driven machines, rarely exceeding 1,500 r.p.m. and at times falling to less than 100 r.p.m. The water turbine driven alternator, which is directly coupled to the turbine shaft, does not differ in general principle from the steam turbine driven machine, but owing to the lower speeds its physical proportions and construction are different. For a given output water driven machinery is usually considerably larger in bulk than its steam driven counterpart.

(2) Standardisation

142. Existing British Standard Specifications relate to the performance of steam driven turbines and alternators and to acceptance tests for both steam and water driven plant.† All the plant is very largely designed to suit the particular site and operating conditions specified by each purchaser and does not lend itself to dimensional standardisation. In the case of steam driven machinery we have been told by the manufacturers, the CEA and consulting engineers that the rigidity resulting from dimensional standardisation whether applied to the machinery as a whole or to the component parts might well hinder technical advance.

143. The CEA, as the chief purchaser of steam driven machinery in the home market, has in recent years introduced a degree of rationalisation by concentrating its requirements on a limited range of outputs and by standardising the steam conditions of all sets of the same output (see paragraph 138). We consider this development in relation to the Groups' price arrangements in paragraphs 214 and 674 to 679.

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* These figures relate to the guaranteed efficiency of the turbo alternator set and not of the power station as a whole: they do not, for example, take account of boiler efficiency, of the quality of fuel used, or of the load factor. The maximum efficiency attainable in the set is dictated by the fact that it has proved impossible to convert more than about half the heat energy supplied to a steam turbine into mechanical energy. There are also inevitably slight additional losses in the alternator.

† The relevant standards are:—
Steam Turbines—BSS 132/1951;
Acceptance Tests for Steam Turbines—BSS 752/1940;
Electrical Performance of Rotating Electrical Machinery—BSS 2613/1955;
Testing of Hydraulic Turbines—BSS 353/1929.

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(3) The Pattern of Trade

144. The following table shows the value of United Kingdom manufacturers' net home and export sales in the years 1951 and 1952:—

£'000

Machinery	1951			1952		
	Home	Export	Total	Home	Export	Total
Steam Driven Machinery for Use on Land						
Turbines, alternators and condensers of 11,000 kW and above	8,416	6,222	14,638	9,404	6,629	16,033
Turbines, alternators and condensers of less than 11,000 kW	969	1,967	2,936	1,447	2,181	3,628
Marine Steam Driven Machinery						
Turbines, alternators and condensers of more than 300 kW	570	16	586	212	9	221
Hydro-Electric Machinery						
Turbines and alternators of more than 300 kW	531	2,090	2,621	268	3,123	3,391
TOTAL	10,486	10,295	20,781	11,331	11,942	23,273

145. The demand for steam turbines and related alternators and condensing and feed water heating plant is generally in a stable proportion. Most purchasers place a single contract for the set, when it is usual for the turbine builder to act as main contractor whether or not he is himself to make all the main component machines. Where separate contracts are placed it is still usual for turbine and alternator to form the subject matter of a single contract, the turbine builder acting as main contractor whether or not he makes both turbine and alternator. In the home market it is the CEA's general policy to place separate contracts for turbine and alternator on the one hand and for condenser on the other: only in one or two isolated cases has the Authority designated different manufacturers for the turbine and the alternator; in the Authority's words "there are difficulties and it means very close co-operation between the two contractors in regard to lining up alternators with the turbine". In the case of export contracts, particularly those placed by purchasers in Australia, the condenser may be of local manufacture. Where hydro-electric machinery is concerned it is usual for turbine and alternator each to be the subject of a separate contract.

146. Water driven and the larger steam driven generating machines are required almost entirely for public electricity supply and are purchased by public authorities at home and overseas. In the home market there has been in recent years virtually only one buyer of large steam driven machinery, namely the CEA,* and one of hydro-electric machinery, namely the North of Scotland Hydro-Electric Board.† Smaller steam generating machinery is

* The present Central Electricity Authority, however, is, since 31st March 1955, no longer responsible for generation in the South of Scotland (see paragraph 37), which accounted for some 6 per cent. of the British Electricity Authority's total installed capacity at that date.

† The CEA's purchases of hydro-electric machinery are relatively small: £276,000 in 1951 and £1,000 in 1952. At vesting date the Authority took over existing hydro-electric plant with an installed capacity of approximately 174 MW.

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purchased by Government Departments, nationalised industries and other large industrial concerns at home and abroad. It is used *inter alia* to supply power and light to refineries, oil fields, individual factories and works, either as the main source of electricity supply or as auxiliary to a public supply system. Steam from the turbine may also in some cases be used for chemical or other processes. The following table shows the value of machinery bought by each of the main categories of purchaser in the home market in the years 1951 and 1952:—

Purchaser	1951					1952				
	Steam	Marine	Hydro	Total Class (*a*)		Steam	Marine	Hydro	Total Class (*a*)	
	£'000	£'000	£'000	£'000	Per cent.	£'000	£'000	£'000	£'000	Per cent.
Supply Authorities										
Central Electricity Authority*	7,548	Nil	276	7,824	74·6	8,896	Nil	1	8,897	78·5
North of Scotland Hydro-Electric Board ...	19	Nil	248	267	2·5	5	Nil	258	263	2·3
Others (mainly in Northern Ireland)	16	Nil	Nil	16	0·1	Nil	Nil	Nil	Nil	Nil
Government Departments	30	125	Nil	155	1·5	76	115	Nil	191	1·7
Industrial Users	1,382	145	1	1,528	14·6	1,750	Nil	3	1,753	15·5
Others	390	300	6	696	6·7	124	97	6	227	2·0
Total	9,385	570	531	10,486	100·0	10,851	212	268	11,331	100·0

* Figures include purchases for stations in the area now covered by the South of Scotland Electricity Board (see paragraph 37).

(4) The Manufacturers*

147. There are 26 manufacturers of one or more of the types of machinery in class (*a*), but so far as this machinery is concerned four of them only do sub-contract work for particular main contractors: eight of the 26 normally make both steam and water driven turbo generating machinery. There is considerable variation among manufacturers as regards both the range of types made and the range of size within those types.

148. Twenty-one manufacturers make one or more of the component machines of a steam turbo alternator set and of these: six make all the machines in the set;† one makes turbines and alternators only; five make turbines and condensers only; four make alternators only; four make condensers only; one (a large engineering concern whose main interests lie outside the scope of our inquiry) makes turbines only, to the design of and for supply to one of the other manufacturers of steam turbo generating machinery.

149. Thirteen manufacturers make hydro-electric generating machinery, and of these: two make both turbine and alternator; four make alternators only; seven make turbines only. Five of the seven turbine builders make only to the design of and for supply to other individual manufacturers of hydro-electric generating machinery, and three of the five have no other interest in machinery the subject of our report.

* The information given in paragraphs 147 to 150 is substantially accurate, but the details vary slightly from time to time and may not be precisely accurate on the date of signature of our report.

† Of the six, one does not make condensing plant for use with turbines of 11,000 kW and above.

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150. The following table gives the names of manufacturers supplying on the open market* and gives some indication of the types and range of machinery made by each:—

Manufacturers	Steam Machinery for Use on Land						Marine Equipment	Hydro Machinery	
	Large (11,000 kW and above)			Small (Less than 11,000 kW)					
	Turbines	Alternators	Condensers	Turbines	Alternators	Condensers		Turbines	Alternators
The British Thomson-Houston Co. Ltd. ...	X	X		X	X	X	X		X
Metropolitan-Vickers Electrical Co. Ltd.	X	X	X	X	X	X	X		X
The English Electric Co. Ltd.	X	X	X	X	X	X	X	X	X
The General Electric Co. Ltd.	X	X		X	X		X		X
C. A. Parsons & Co. Ltd.	X	X	X	X	X	X	X		
The Brush Electrical Engineering Co. Ltd.	X	X	X	X	X	X			
Richardsons, Westgarth (Hartlepool) Ltd.	X	X	X	X	X	X			
Hick, Hargreaves & Co. Ltd.			X	X		X			
The Mirrlees Watson Co. Ltd.			X			X			
G. & J. Weir Ltd. ...			X			X			
Worthington-Simpson Ltd.			X			X			
Daniel Adamson & Co. Ltd.				X		X			
W. H. Allen, Sons & Co. Ltd.				X		X	X		
Bellis & Morcom Ltd. ...				X		X	X		
Peter Brotherhood Ltd. ...				X		X	X		
The Harland Engineering Co. Ltd.					X			X	X
Lancashire Dynamo & Crypto Ltd.					X				
Mather & Platt Ltd. ...					X				
Bruce Peebles & Co. Ltd.					X				X
Vickers-Armstrongs Ltd.			X			X			
Boving & Co. Ltd. ...								X	
Gilbert, Gilkes & Gordon Ltd.								X	

151. The manufacturers differ considerably from one another not only in the range of types of machinery made, but also in the total value of their production within the class as a whole and in the relative importance of their production of different types of machine. In each of the years 1951 and 1952 the aggregate sales of five of the manufacturers, each making a wide range of machinery within the class, were equal to about 87 per cent.

* That is, the 26 manufacturers who make machinery in class (*a*), excluding the four who make only for particular main contractors (see paragraph 147).

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of the total net sales* of machinery in class (*a*); the sales of each as proportions of the value of total net home market and export sales are shown below:—

Manufacturers	1951			1952		
	Home	Export	Total	Home	Export	Total
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
The British Thomson-Houston Co. Ltd.	15·8	10·2	13·0	9·3	13·8	11·6
Metropolitan-Vickers Electrical Co. Ltd.	29·4	18·6	24·0	29·5	21·0	25·1
The English Electric Co. Ltd. ...	24·2	24·6	24·4	19·4	24·6	22·0
The General Electric Co. Ltd. ...	3·0	4·8	3·9	8·2	5·1	6·6
C. A. Parsons & Co. Ltd. ...	17·3	27·9	22·6	22·4	20·6	21·5
TOTAL	89·7	86·1	87·9	88·8	85·1	86·8

Of the five, only one (The English Electric Co. Ltd.) makes a complete range of all types and sizes of machine in the class. One (C. A. Parsons & Co. Ltd.) makes only steam driven machinery, but in terms of this machinery only the company's sales represented 18·3 per cent. of home sales and 35·1 per cent. of export sales in 1951, and 23·0 per cent. of home sales and 27·9 per cent. of export sales in 1952. It will be seen from the table above that in each of the two years concerned the two companies, Metropolitan-Vickers Electrical Co. Ltd. and The British Thomson-Houston Co. Ltd., which are wholly owned subsidiaries of Associated Electrical Industries Ltd. (AEI) together supplied 37 per cent. by value of all machinery in class (*a*) and accounted for over 38 per cent. of home supplies in each year. We describe the position of the two companies further in Chapter 14. The fifth company The General Electric Co. Ltd. was responsible for a smaller proportion of sales of machinery in class (*a*) than any of the other four, but is one of the five leading manufacturers of machinery which comes within the scope of our report.

* "Total net sales" means sales to ultimate users. A small proportion of the sales of these five manufacturers represented goods made for them by other manufacturers.

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(5) The Group and International Electrical Association Ltd. Agreements

152. There are 30 current agreements relating to machinery in class (*a*). In the table which follows International Electrical Association Ltd. (IEA) agreements are shown in italics:—

Subject Matter	Home		Export	
	Notification	Price	Notification	Price
I. Steam Machinery for use on Land				
A. Large machinery of 11,000 kW and above				
(i) Turbines	Large Turbine Agreement (Home)	Large Turbine Price Agreement (Home)*	Large Turbine Agreement (Export) *Notification Agreement for Steam Turbines*	*Turbine Plant Export Agreement*
(ii) Alternators ...	Large Turbo-Type Alternator Agreement (Home)	Large Turbo-Type Alternator Price Agreement (Home)	Large Turbo-Type Alternator Agreement (Export) *Notification Agreement for Steam Turbine-Driven A.C. Generators*	
(iii) Condensers ...	Large Condenser Agreement (Home)	Large Condenser Price Agreement (Home)*	*Notification Agreement for Steam Condensing Plants.* See also Home†	
B. Small machinery from 300 kW up to but not including 11,000 kW				
(i) Turbines	Small Turbine Agreement (Home)	Small Turbine Price Agreement (Home)*	Small Turbine Agreement (Export) *Notification Agreement for Steam Turbines‡*	Small Turbine Price Agreement (Export)*
(ii) Alternators ...	Small Turbine-Driven Alternator and Generator Agreement (Home)	Small Turbine-Driven Alternator and Generator Price Agreement (Home)	Small Turbine-Driven Alternator and Generator Agreement (Export) *Notification Agreement for Steam Turbine-Driven A.C. Generators‡*	Small Turbine-Driven Alternator and Generator Price Agreement (Export)

See notes on opposite page.

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Subject Matter	Home		Export	
	Notification	Price	Notification	Price
(iii) Condensers ...	Small Condenser Agreement (Home)	Small Condenser Price Agreement (Home)*	Small Condenser Agreement (Export) *Notification Agreement for Steam Condensing Plants*†	Small Condenser Price Agreement (Export)*
II. Marine Steam Machinery				
A. Machinery for ship propulsion				
Steam turbo electric ship propulsion equipment of any S.H.P.	Ship Propulsion Equipment Agreement		See Home	
B. Machinery for auxiliary purposes				
Auxiliary steam turbo generator unit of not less tban 100 kW.	Marine Turbo-Generator Agreement	See Notification§	See Home	See Home
III. Hydro Machinery				
(i) Turbines of 5,000 B.H.P. and above and turbine installations of 10,000 B.H.P. and above;			*Notification Agreement for Water Turbines*	*Hydro-Electric Plant Arrangement*
(ii) Alternators of 2,000 kVA and above.	Large Dynamo and Motor Agreement‖		*Notification Agreement for Water Turbine-Driven A.C. Generators*	

* Also contains provisions relating to the price of feed water beating equipment.
† See footnote to paragrapb 156.
‡ Does not cover machinery from 300 kW up to 3,000 kW.
§ See paragraph 268.
‖ Relates mainly to macbinery in class (*b*) (see paragrapb 320).

The provisions governing the type and range of machinery covered by each agreement are set out in greater detail in Appendix 4.

153. The only current Group agreement relating to hydro-electric machinery is a notification agreement (the Large Dynamo and Motor Agreement) which is concerned mainly with machinery in class (*b*); there are no informal arrangements between the manufacturers relating to the supply of this machinery in the home market. Enquiries and orders for hydro-electric machinery for export are notified under two IEA notification agreements: in addition the five British members of the notification agreements operate the Hydro-Electric Plant Arrangement. The Arrangement is not embodied in a formal agreement but in a joint resolution of those concerned. Although it is not specifically or exclusively a price arrangement, its main purpose is to

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facilitate agreement on common minimum prices for enquiries as they occur; in practice prices are frequently but not always agreed. There are no arrangements for compensation.

154. Machinery for use on board ship is expressly excluded from the scope of Group agreements relating to other steam turbo generating machinery; it is similarly excluded from the sphere of the IEA.* It forms part of the subject matter of two Group agreements, both of which also cover some machinery in class (*b*)† as well as machinery outside the scope of our inquiry. Price arrangements are operated under one of the two agreements (see Chapter 12).

155. The manufacturers' arrangements are most complete in the case of steam turbo generating machinery for use on land, which comprises the greater part of all machinery in class (*a*). The Groups distinguish between "large" machinery (that is, turbines, alternators and condensers with a capacity of 11,000 kW and above) and "small" machinery (that is, similar machines of a capacity of 300 kW and up to 11,000 kW), a distinction which the British members of the IEA carry into their price arrangements under that Association. As the table in paragraph 144 shows, in each of the years 1951 and 1952 more than 80 per cent., by value, of the manufacturers' net home and export sales of steam driven machinery for land use were of large machines. In 1952 94 per cent. by value of all large machinery supplied in the home market was supplied to the CEA; the Authority does not normally purchase small machinery.

156. Arrangements relating to notification, compensation for tendering expenses and common minimum prices exist for all types and sizes of steam turbo generating machinery for use on land in both home and export markets. In the home market all these and other related arrangements are covered by the Group agreements: in export markets they are covered partly by Group and partly by IEA agreements. Arrangements for the notification of enquiries and orders for all machinery of a capacity of 300 kW or above for export are operated under Group notification agreements;‡ in the case of machinery exceeding 3,000 kW capacity there are similar provisions in the IEA notification agreements, and this is the only point where the arrangements of the two organisations for machinery in class (*a*) overlap (see also paragraph 94). Arrangements for common minimum prices for small machinery for export are operated under Group price agreements and for large machinery under the IEA Turbine Plant Export Agreement, membership of which is confined to United Kingdom manufacturers: while this last agreement expressly relates only to turbines and alternators of 11,000 kW capacity and above, the prices of related condensers are also agreed in practice. Arrangements for compensation are operated in conjunction with price arrangements in the case of both large and small machinery. Provision for compensation is made in all Group notification agreements and in the Turbine Plant Export Agreement; but the relevant provisions of the Group export notification agreements for large machinery are optional and in practice are not invoked, so that there is no duplication of payments.

157. In addition to the main provisions referred to above, signatories of Group agreements relating to steam turbo generating plant and of the Turbine

* In addition, the Group agreements exclude machinery for use on floating docks and locomotives and the IEA agreements that for use on floating docks and dredgers.

† The proportion in the case of the Marine Turbo-Generator Agreement is roughly two-thirds in class (*a*), one-third in class (*b*).

‡ There is no separate Group export notification agreement for large condensers. The notification of export enquiries is, however, provided for under an appendix to the Large Condenser Agreement (Home), by resolution of the signatories of that agreement.

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Plant Export Agreement undertake certain other obligations, including inter-contracting arrangements whose main effect is to ensure that the turbo alternator set as a whole is subject to the same common minimum price, whether or not the component machines are made by a single contractor.

158. With the increase in capacity of machinery over the years, the relative importance of small to large machinery has progressively declined and the dividing line of 11,000 kW is now in some ways arbitrary. The manufacture of large machinery is confined broadly to the larger concerns: to an increasing extent it calls for great resources not only of capital and plant, but also of factory floor space, so that at present not all even of the signatories of the agreements relating to large machinery have the necessary resources to manufacture the machines of 100, 120 and 200 MW capacity now required by the CEA.* While therefore all signatories of these agreements also make the corresponding small machinery and are signatories of the relevant agreements, the converse does not hold good. A further difference lies in the fact that while all signatories of the agreements relating to large machinery who build large turbines also make the corresponding alternators, the signatories of the small turbine agreements include concerns which do not make the corresponding alternators and must therefore depend upon other manufacturers to supply them; similarly there are signatories of the small alternator agreements who make only alternators. In view of the contractual pattern and the interdependence of the main component machines of a turbo alternator set, there is naturally a close relation between agreements covering turbines, alternators and condensers of equivalent output. Although there is no formal provision to that effect, signatories consider it essential that manufacturers who are signatories of one agreement should also subscribe to other related agreements covering the types of machinery they make: thus a signatory of the small turbine agreement would also be expected to join the small alternator or small condenser agreements if he manufactured alternators or condensers of appropriate capacity. This applies to both Group and IEA agreements.

159. More generally, over the whole range of machinery in class (*a*), where separate agreements are operated a manufacturer may join a notification agreement without participating in the corresponding price agreement or in less formal price arrangements:† but he could not join the price agreement unless he subscribed to the notification agreement.

(6) Membership of the Agreements

160. All current Group agreements relating to machinery in class (*a*) provide that "any . . . bona fide manufacturer in the United Kingdom" of machinery the subject matter of the agreement concerned "on making application, shall be admitted . . . by a simple majority vote" of the existing signatories. The Groups have always considered it necessary that applicants should have demonstrated before admission their ability to manufacture machinery of the types and size or capacity ranges covered by the relevant agreement to the standard of quality maintained by the existing signatories; this requirement applies equally in the case of a signatory of agreements covering small machinery who seeks admission to the agree-

* The Groups concerned have told us that while technical developments "may possibly have the effect on very large sets of driving all that business into a relatively small number of hands . . . there would still be a lot more bread and butter business in the 60, 30, 20, 15, 10 and 5 MW which would keep the other firms in business . . ."

† In the case of the IEA, signatories of notification agreements were not obliged to join the corresponding compensation agreements when these operated.

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ments covering large machinery.* All Group agreements provide that a signatory may withdraw on six months' notice. New signatories of the IEA notification agreements, who must first be members of the corresponding IEA Sections (see paragraph 76), are admitted by a 75 per cent. majority vote and may withdraw on one year's notice. There are no provisions relating to the admission of new signatories under either the Turbine Plant Export Agreement or the Hydro-Electric Plant Arrangement; existing signatories may withdraw from these on three or six months' notice respectively.

161. Details of membership of agreements are given in Appendix 3. With the following exceptions, all the manufacturers in the United Kingdom of machinery in class (*a*) are signatories of all Group and IEA agreements and arrangements relating to machinery of types and ranges which they manufacture:—

(i) In 1950 C. A. Parsons & Co. Ltd., withdrew from the Group price agreements relating to supply in the home market of large steam turbo generating machinery, although the company still co-operates with signatories in maintaining common minimum prices on all enquiries other than those from the CEA. The circumstances connected with this withdrawal are described in Chapter 9. The company is still a signatory of the corresponding notification agreements, of the notification and price agreements relating to small machinery for home and export, and of the IEA notification agreements and Turbine Plant Export Agreement.

(ii) Vickers-Armstrongs Ltd., whose normal manufacturing interest in machinery covered by our terms of reference is confined to condensers and feed water heating plant, is not a signatory of any agreement. The company was formerly a signatory of the Group notification and price agreements relating to both large and small condensers, but resigned from all four agreements at varying dates in 1941 and 1942.

(iii) The Brush Electrical Engineering Co. Ltd. is a signatory of all Group notification and price agreements relating to large and small steam turbo generating machinery for both home and export markets: it is a signatory of the IEA notification agreements for large steam generating machinery, but not of the Turbine Plant Export Agreement which covers export price arrangements for such machinery and to which all other United Kingdom signatories of the relevant IEA notification agreements belong.

(iv) Richardsons, Westgarth (Hartlepool) Ltd. is a signatory of all notification and price agreements relating to small steam generating machinery in both home and export markets and to large machinery in the home market: the company does not export large machinery and is not a signatory of the corresponding agreements relating to large machinery for export.

* We have noted from the records of the Groups concerned four cases of unsuccessful applications. In one case, in 1942, a concern established in other branches of electrical manufacture and which was already a signatory of Group agreements relating to machinery in class (*b*) was refused admission to the small alternator agreements on the grounds that the company was not an established manufacturer of the machinery concerned. The three other cases relate to the large condenser agreements. One of the applicants was later admitted. The other two which were already signatories of the corresponding small agreements, were in 1939 admitted as "courtesy signatories", it being recorded in one case that the company had not demonstrated its ability to design and manufacture large condensing plant and that factory capacity and manufacturing facilities by themselves were an insufficient qualification. This arrangement came to end when the two companies withdrew.

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(v) The Harland Engineering Co., Ltd. is a signatory of the Group notification and price agreements for small alternators for the home market, but not for the export market. The company is a signatory of the IEA notification agreement for water turbines, but not of the notification agreement for water turbo alternators, although it manufactures these machines, nor of the Hydro-Electric Plant Arrangement which covers export price arrangements for water turbo alternator units and to which all the other United Kingdom signatories of the relevant IEA notification agreements belong.

(vi) There are two companies making hydro-electric machinery (apart from those who make only to the designs of other manufacturers—see paragraph 149) which are not members of the IEA agreements relating to this machinery.

(vii) A few other companies occasionally make products outside their normal range which are covered by agreements of which they are not signatories.

Except for Boving & Co. Ltd., all United Kingdom signatories of agreements are also members of the BEAMA.

162. We describe the main provisions and operation of agreements relating to steam turbo generating machinery in Chapters 7 to 11, those relating to marine equipment in Chapter 12, and those relating to hydro-electric machinery in Chapter 13.

CHAPTER 7. STEAM TURBO GENERATING MACHINERY: ORIGINS OF THE AGREEMENTS: NOTIFICATION AND COMPENSATION FOR TENDERING EXPENSES

(1) Origins

163. In 1909 the manufacturers of steam turbines and associated electrical machinery and condensing plant together formed the Steam Turbine Manufacturers' Association: there were eight original members including six who are still signatories of Group agreements, and the Association was in effect the predecessor of the present Groups. Its members' first concern was to revise "on a more equitable basis" the "extremely onerous contractual conditions which the manufacturers were then expected to accept . . .". Slightly later they discussed the introduction of a "royalty" scheme whereby every price tendered, was to include a certain sum to be divided, after provision for the running expenses of the Association, among those members who incurred expense in the preparation of a tender. About 1912 the members concluded separate agreements covering steam turbines, alternators and condensers and each providing for notification and royalty. Corresponding prices agreements were introduced from 1911/12 onwards. In 1929 separate agreements to cover large as distinct from small machinery were introduced. There were then in existence formal Group notification and price agreements covering both large and small turbines, alternators and condensers in the home market and notification agreements covering exports.* Between dates in 1931 and 1934 price arrangements were suspended. Thereafter revised agreements relating specifically to small machinery were introduced. Meanwhile, the signatories of the large turbine and large alternator price agreements

* There is no formal agreement covering large condensers for export (but see footnote to paragraph 156).

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entered into a supplementary quota agreement intended to secure to each a specified percentage quota of an agreed block of business ;* under this agreement signatories selling in excess of their quota paid compensation which was distributed *pro rata* to those in deficit, and all signatories were bound to observe their obligations under the main price agreements. The quota agreement was in being between dates in 1935 and 1937, but no compensation was paid. From November, 1936, there was also a private arrangement between four of the big companies† that they would quote a price 7½ per cent. above the common minimum price for the turbine on any home market enquiry to enable other signatories to increase their share of the business: this arrangement was not administered by the Groups and has not been operated since about 1940. Price arrangements for all small and large machinery supplied in the home market have been operated continuously since 1935.

164. In the meantime some signatories of the Group agreements had joined the International Notification and Compensation Agreement in 1930 and the separate notification and compensation agreements by which it was replaced in 1933 (see paragraph 75). In 1937 United Kingdom signatories of the relevant International Electrical Association (IEA) notification agreements entered into an informal Turbine Plant Export Arrangement, which was in turn replaced in 1944 by the Turbine Plant Export Agreement providing for common minimum prices for large steam turbo generating machinery for export; the agreement was revised in 1952 and again in 1955. The corresponding Group price agreements relating to small machinery for export were not formally concluded until 1953, but they had been in draft and observed in practice since 1941.

(2) Notification

165. The purposes of notification are basically the same whether the Groups or the IEA operate the agreements: namely, to create a basis for further co-operation and to provide statistical information. The procedure laid down under all current Group notification agreements is the same, and the provisions are generally similar to those of earlier agreements which we have examined. Each agreement provides that on receiving information of a purchaser's requirements each signatory shall in every case notify the Secretary by means of duplicate printed notification cards, giving details of the machinery, the name of the prospective purchaser and the date by which tenders are required, and stating whether or not the signatory concerned means to tender. On receiving these duplicate cards, the Secretary allots a reference number to the enquiry and enters the number on one of the two cards which he returns to the notifying signatory. The Secretary advises all signatories of the agreement daily of enquiries notified: the advice card used for this purpose shows the reference numbers of enquiries received and the names of those signatories who have notified in every case, but gives no further details. As the result of this procedure signatories who have notified a particular enquiry know the names of all other signatories who may tender, but the information circulated does not in itself give particulars of the job to other signatories of the agreement.

166. The Group notification agreements provide that on receipt of an order every signatory must at once notify the Secretary, giving the number and capacity of the machines ordered. The Secretary thereupon passes this

* Namely orders for machinery up to a total of 1,500,000 kW.

† Namely:—The British Thomson-Houston Co. Ltd., The English Electric Co. Ltd., Metropolitan-Vickers Electrical Co. Ltd. and C. A. Parsons & Co. Ltd.

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information to all signatories of the agreement who notified the particular enquiry. At the same time he calculates and informs each of the total amount of tendering expenses included in the order price, the amount payable to the Administration Fund of the agreement (see paragraph 178), the names of the signatories who notified the enquiry and of those who tendered, and the amount of tendering expenses due to the recipient of the particular advice card. Statistics based on information notified and showing for each successful negotiation the number of tenderers and name of successful tenderer, the date of notification of order, number and total capacity of machines ordered and rate and total amount of tendering expenses, are subsequently circulated in the Secretary's quarterly reports to all signatories of the agreement including those who did not notify: the Secretary also issues quarterly and annual reports under each notification agreement showing the total business transacted by each individual signatory in terms of capacity of plant.

167. Procedure under the IEA notification agreements is generally similar, but in the case of those signatories of the turbine and alternator notification agreements who are also signatories of the Turbine Plant Export Agreement, a single notification suffices on any one enquiry. In addition any signatory of an IEA notification agreement receiving information that an order has been placed with a non-signatory is under obligation to report this fact with any details which he may have to the Secretary, who must in turn advise all signatories who tendered. The Secretary of the IEA also circulates reports under each agreement showing (i) the number of enquiries notified, (ii) the number, total capacity, description and "average size" of machines ordered from signatories, and (iii) similar information concerning machines reported to have been ordered from non-signatories. The reports do not give money values.

(3) Compensation for Tendering Expenses

168. Before the revision of 1951 these arrangements were referred to in all Group notification agreements as "royalty" arrangements. The current Group home market notification agreements provide that every signatory shall include in every tendered price for machinery the subject matter of the agreement a sum to cover tendering and associated expenses; this sum is to be calculated according to specified formulae related to the square root of the capacity of the machinery concerned.* In both Group agreements covering turbines in the home market for example the current compensation formula is £400 $\sqrt{\frac{kW}{RPM}}$. The successful tenderer must pay to the Secretary the amount of tendering expenses due in respect of his contract, and the Secretary must subsequently credit the moneys so received to individual signatories of the agreement (see paragraph 166). The method of distribution varies according to the number of signatories who originally notified the enquiry: where only one signatory notified, two-thirds of the total is returned to him and the remaining one-third is divided equally among all signatories of the agreement, including the notifier; where two notified, each receives one-third and the remaining one-third is divided among all signatories, including the two notifiers; where more than two notified, the amount paid in to the Secretary is divided equally among all notifying signatories.

169. On enquiries where tenders are invited, notifiers share in the distribution of compensation whether they have submitted a tender or not. When the CEA allocates orders to individual manufacturers for machinery covered

* A signatory tendering to a fellow signatory is to include the appropriate sum, but a signatory tendering on plant to be manufactured to his order by a fellow signatory is not to add anything for tendering expenses, so that the sums due are included only once in the price to the purchaser.

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by the three notification agreements for large machinery in the home market (see paragraph 204), the amounts paid in respect of compensation are distributed equally to all signatories.*

170. The amounts due to each signatory in respect of tendering expenses are paid to him monthly by the Secretary. In 1952 compensation paid on orders notified under the six home market agreements was as follows:—

	Large £	*Small* £
Turbines	35,606	13,099
Alternators	38,270	4,451
Condensers	18,256	6,233
	92,132	23,783
	£115,915	

The Groups' procedure for payment and distribution has remained generally unchanged throughout all earlier texts of the agreements examined. The formulae themselves have remained unchanged for many years; as they are related to output, the yield as a percentage of price has therefore dropped during this time. The Groups' minutes record that in March, 1951, the manufacturers estimated the yield in the case of the largest machines as:—

	100 MW Per cent.	60 MW Per cent.	30 MW Per cent.
Turbine...	0·7	1·2	1·6
Alternator	1·0	1·2	1·9
Condenser	0·9	1·0	1·5

171. The provisions of the Group notification agreements for export are the same as those covering the home market except that under the two agreements covering large turbines and large alternators for export compensation is optional and no formula for calculating the amount of any payment due is given.† In practice this option is exercised negatively and compensation for these types of plant and also for large condensers is instead payable under the IEA Turbine Plant Export Agreement, which also contains the price arrangements (see paragraph 94). The Turbine Plant Export Agreement compensation formulae for large turbines and large alternators are also related to the square root of capacity of the machine, although they differ from the corresponding Group formulae: in practice while the price to the purchaser is enhanced by an amount calculated in accordance with the Group formula, the sum subsequently paid by the successful tenderer to the Secretary is calculated according to the IEA formula.‡ Thus a signatory of the agreement when tendering for a large turbine, for example, would include in his tender price a sum calculated from the formula

* In 1944 the signatories agreed that on home market orders placed subject to direction by the Heavy Electrical Plant Committee (see paragraph 25) signatories should share in royalty irrespective of notification.

† Until 1941 "royalty" was also optional under the export notification agreements for small machinery.

‡ Before 1952 the amounts due were calculated in cents per kW or kVA according to formulae in the former IEA compensation agreements suspended in 1942. We are told by the Association that the effect of the 1952 amendment has been to reduce the amount of compensation payable on larger machines covered by the agreement, the yield on the smaller machines remaining at about the same level.

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£400 $\sqrt{\frac{kW}{RPM}}$; if successful in obtaining the contract he would later pay to the Secretary in sterling a sum calculated from the formula \$50 $\sqrt{kW}$ convertible at a nominal rate of 5 dollars=£1. The subject matter of the Turbine Plant Export Agreement does not cover condensers and feed water heating plant although the majority of enquiries notified are for complete turbo alternator sets, for which a lump sum price is usually quoted. Where this is the case, compensation for the condenser and feed water heating plant is settled from job to job, usually at the rate of 2 per cent. of the agreed price of the condenser. Compensation under the Turbine Plant Export Agreement is divided equally among the parties to the price arrangement for the particular enquiry concerned (that is, to the tendering signatories including the successful tenderer), the amounts due to and from each signatory of the agreement being paid quarterly. The Turbine Plant Export Agreement is now the only IEA agreement relating to machinery in class (*a*) under which compensation arrangements are operated. Payments under the agreement amounted to £141,993 in 1952* (see paragraphs 81 to 83).

172. We have described the purposes of the IEA's compensation arrangements in paragraph 82. The Groups' arrangements are similar to the Association's current arrangements in that both aim at reimbursing their members for at least part of the cost of preparing and submitting tenders; in each case the sums yielded and the formulae by which they are calculated are not based on costs actually incurred, and compensation payments are not confined to signatories who tender.

173. We asked the Groups concerned with steam turbo generating machinery why they have retained compensation although some Groups concerned with other types of machinery have dropped it. They replied that while they cannot speak for other Groups, in their own case compensation is necessary to recompense them to some extent for the great amount of work involved in preparing tenders for the types of machinery with which they are concerned and for the very considerable technical and commercial staffs which they must maintain for this purpose whether orders result or not and irrespective of the number of tenders called for in any one period. They have shown us specimen tenders each amounting in bulk to a book of foolscap size about one inch thick. They have also told us that the amount of compensation on an enquiry for machinery of £250,000 value, for example, works out at about £1,800; they point out that while this may appear a substantial sum for preparing a single tender, the manufacturer may in fact have to prepare more than one to cover alternative specifications and he may not in the end get that particular order; on other enquiries he may have to do a great deal of work before he can decide whether he can tender at all. In those cases where he either tenders and fails to get an order or after preliminary work decides not to tender he has virtually "done that work for nothing". The Groups maintain that the costs of tendering are a continuous charge on the manufacturers and cannot really be related to a particular enquiry. In their view compensation works on a principle of "swings and roundabouts"; neither on an individual tender nor over a period, however, do the sums of money received by any means cover the costs involved.

174. We also asked the British members of the IEA why they consider it desirable to operate compensation arrangements for steam turbo generating machinery under the Turbine Plant Export Agreement, but not for hydro-electric machinery under the Hydro-Electric Plant Arrangement. They replied that "on the water turbine side . . . we just have not been in the habit

* Including compensation on the related condensing plant.

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of having compensation". They have no present intention either of dispensing with compensation on steam driven machinery or of introducing it for hydro-electric plant, although (as already noted in paragraph 88) it is possible that foreign members may wish to reintroduce some wider form of compensation for all machinery.

CHAPTER 8. STEAM TURBO GENERATING MACHINERY: THE PRICE ARRANGEMENTS

(1) Home Market Price Arrangements

(A) *The Price Provisions of the Agreements*

175. The main component machines in a turbo alternator set are priced individually under separate Group price agreements;* each agreement comprises a main text and a series of schedules dealing with prices and related matters which are applied in accordance with provisions of the main text. The provisions and procedure of the different agreements are similar. Any variations between them are due either to the type of machine or to the capacity range and market conditions peculiar thereto. All current home market price agreements include among their objects that of ensuring "that prices are established at a reasonable and competitive level based upon the costs of economical production". The signatories of each are bound in all cases when offering machinery covered by the agreement to quote "not less than the Standard Price" as defined in the price schedules of the agreement concerned; they are also bound normally to quote a lump sum price without any break down. The provisions of price agreements covering each of the component machines are extended to the set as a whole by means of inter-contracting agreements incorporated in the schedules to each price agreement.

176. The prices of all machines of capacity up to and including 60 MW are covered by schedules to the price agreements and are calculated from those schedules:† we describe the method of calculation and the application of the price provisions to this range of machinery in paragraphs 177 to 187. The agreements provide that prices for machines of capacities greater than those scheduled shall be arrived at "by a fair extrapolation" from the price schedules, but this method has not in fact been found practicable for the latest reheat turbines and alternators of capacities exceeding 60 MW required by the Central Electricity Authority (CEA). Prices for these very large

* Namely:—
The Large Turbine Price Agreement (Home)
The Large Turbo-Type Alternator Price Agreement (Home)
The Large Condenser Price Agreement (Home)
The Small Turbine Price Agreement (Home)
The Small Turbine-Driven Alternator and Generator Price Agreement (Home)
The Small Condenser Price Agreement (Home)

† The current schedules for condensers also cover condensing plants large enough for use with turbines up to 120 MW. In the case of turbines and alternators the range of capacities scheduled was formerly longer, but when the schedules were revised in 1952 the Groups felt that as designs were changing rapidly it would be wise to limit the upper limit of the range at the point where they were reasonably stable. The Groups do not propose to extend the present range of the schedules of the agreements until dependable costing data are available and members are satisfied that their designs and manufacturing technique have reached a satisfactory degree of stability. They point out that up to five years must elapse before the performance and cost of manufacture of a new design can be fully assessed, so that in the meantime in the case of turbines and alternators, only estimated costs are available as a basis for tendered prices "for these larger and technically more advanced" machines. The old schedule prices for machines exceeding 50 MW had covered only machines of speeds up to 1,500/1,800 r.p.m. which are no longer used.

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machines have instead been agreed *ad hoc* on the basis of suggested prices tabled by the manufacturers concerned; these *ad hoc* arrangements have included prices for the associated condensers which, however, in the case of 100 MW and 120 MW sets can be and are calculated from the schedules to the condenser price agreement. The manufacturers' discussions and the method of pricing these machines of 100 MW, 120 MW and 200 MW capacity are closely bound up with wider negotiations between the Groups and the CEA and with the position of C. A. Parsons & Co. Ltd. (Parsons) in relation to both the Groups and the Authority, and are accordingly described in Chapter 9 (see paragraphs 222 to 226).

(B) *Calculation of the "Standard Price" for Machines of Capacity up to and including 60 MW*

177. The "standard" or maintained price for a machine is composed of two main elements, namely a schedule price, adjusted by a schedule price factor. The schedule price is not a list price in the usual sense, but a minimum price for a particular machine and a particular enquiry built up from a number of very detailed price schedules. The schedules themselves relate to the main machine, and to additional charges for such extra equipment or services as are required: they are intended by the Groups to include all services and items of equipment normally called for by the purchaser. The method of applying the schedules and of agreeing prices for extra equipment where these are not specified in the schedules is described in paragraphs 186 and 187.

178. In the case of large turbines, for example, the minimum price for a particular enquiry for a turbine of not more than 60 MW is made up of:—

(i) the basis price for the turbine taken from a schedule which tabulates prices for high pressure condensing turbines ranging from 11 to 60 MW CMR, when designed for steam pressure of 300 lbs. gauge, steam temperature of 550°F., and 28" vacuum, with specified standard thermo-dynamic efficiencies at loads of 100 per cent., 80 per cent., 60 per cent. or 40 per cent. operating at speeds ranging from 1,500 r.p.m. to 3,600 r.p.m. The basis price covers not only the turbine itself, but also the "standard equipment" consisting of 31 items including services such as take-over tests on site;

(ii) specified percentage increases to the basis price (item (i)) if the turbine is required to operate with higher steam pressure, steam temperature or vacuum.

(iii) a specified percentage of the basis price (item (i)) to cover the cost of the alternator bedplate and bearings if the alternator is directly driven by the turbine. Where the alternator is driven through reduction gears, the price to be included for the gears is agreed through the Secretary;*

(iv) specified percentages of the sum of items (i), (ii) and (iii) to cover the cost of skilled or of complete erection. These figures apply to a direct-connected set; in the case of a geared set the amounts are agreed through the Secretary;*

(v) a price, specially arranged, for abnormal tests for efficiency and reliability; that is, tests other than take-over tests which are included in the "standard equipment" (see (i) above);

(vi) prices for certain specified standard extras, including feed water heaters; these are either scheduled prices or are agreed through the Secretary;

* Large turbines are only geared in exceptional cases and then only at the lower end of the large turbine range.

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(vii) a specified percentage (the schedule price factor) of the sum of items (i) to (vi);

(viii) prices for certain other specified standard extras taken from a schedule;

(ix) prices agreed through the Secretary for non-standard extras if required;

(x) the sums calculated under the notification agreement for compensation and administration.

179. The sum of items (i) to (x) constitutes the minimum price for a turbine of "standard" efficiency. The minimum efficiency which signatories are permitted to offer under the agreement is now, however, higher than the scheduled "standard" efficiency (see item (i)).* The efficiency offered by a tenderer on a particular enquiry may, of course, exceed this stipulated minimum. In order to arrive at his "standard price", therefore, the tenderer must calculate the percentage by which the actual designed efficiency of the turbine he proposes to offer—which must not in any event be less than the stipulated minimum efficiency—exceeds the "standard" efficiency of a machine of the same capacity and operating conditions and must add to the minimum price for a machine of "standard" efficiency the appropriate scheduled percentage of the basis price (item (i)) as corrected for erection (item (iv)) and by the schedule price factor (item (vii)).

180. The problems posed by the purchaser's requirements in most cases allow of more than one technical solution; in tendering, individual manufacturers will for example take into account the cost of fuel and the probable load factor when deciding the efficiency of machine most likely to commend itself to the purchaser. The "standard price" for the enquiry will accordingly differ as between individual signatories of the price agreements in accordance with their assessments of the efficiency required; only if all signatories reached the same conclusions would the "standard price" be the same for all.

181. The method of calculation under the alternator and condenser price agreements is generally similar; the details are adapted to suit the characteristics of the machine concerned.

182. The prices scheduled for the main machines (see paragraph 178 (i)) represent an agreed compromise based on suggested selling prices submitted by the signatories concerned; at no times have they been based on centrally submitted costs. Where the interests of two or more Groups coincide or overlap, as in the case of prices for machinery at the top limits of agreements covering small machinery and the lower limits of corresponding agreements covering large machinery, there has been inter-Group consultation. The prices scheduled for additional equipment and services are in some cases based on those of other Groups: thus prices for motors for driving condensing plant auxiliaries, which are scheduled as standard extras in the condenser agreements, are obtained from the signatories of the Dynamo and Motor Agreement and are based on the prices under that agreement;† similarly prices for turbines for driving condensing plant auxiliaries are obtained from the turbine Group and agreed by signatories of the condenser agreement through the Secretary. Feed water heating

* This arises from the technical progress in design and operating conditions which has taken place since the basis price schedules were first drawn up.

† The condenser makers obtain from the motor Group prices calculated in accordance with the price schedules of the Dynamo and Motor Agreement. To these the condenser makers add a safety margin, after which the motor prices are incorporated as schedules to the condenser price agreements.

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equipment, which was formerly priced under the condenser agreements, is now priced under the turhine agreements.

183. The form of the price schedules for the main machines and the prices they contain underwent no major change from the date of introduction of the schedules in 1929, 1936, 1937 and 1938 until the conclusion of the current agreements in 1952 and 1953. The changes then introduced for turbines and condensers reflected the many technical changes and advances in design which had taken place over the years, and were the outcome of a general review of the price schedules which had been started towards the end of the war. Since the design of alternators has not radically altered there has been no major change in the hasis price schedules for these machines.

184. Schedule prices are changed either when the specification of the main machine changes or when the signatories wish for some other reason to alter the prices applicable over a limited range of types or sizes of machines. When, as a result of changes in general production costs, it is desired to change prices equally over the whole range of machinery covered by an agreement the schedule price factor applicable to that agreement is changed. These factors, which were first introduced into the various agreements in the years 1936 to 1938, may represent either a percentage increase or a percentage decrease on schedule prices ; in practice market conditions and movements in the cost of lahour and materials have heen such that so far they have always represented an increase. The basis and method of calculating the factors is described in paragraphs 578 and 579 : it is sufficient here to say that since 1943 they have heen related to returns by individual signatories showing changes in their costs for labour, materials and overheads.

185. The main price provisions described above are supported hy a number of secondary provisions which in their total effect make it difficult or impossible for signatories to evade their price maintenance obligations or to offer any form of indirect price inducement which might encourage a purchaser to place a contract with one signatory rather than another. For instance the border-line between corresponding large and small machinery is carefully covered. No signatory of a price agreement covering large machinery may offer machinery smaller than the minimum size covered hy the agreement in response to an enquiry for machinery within the scope of the agreement without prior notice: cases where a single enquiry includes machinery which is within the scope of agreements covering both large and small machinery would he handled hy joint consultation between the signatories of both. Similarly should a signatory of a price agreement covering small machinery who is not also a signatory of the corresponding price agreement for large machinery decide to offer machinery larger than the maximum under the agreement to which he is a party in response to an enquiry notified under that agreement, he must quote in accordance with the price and other obligations of the appropriate agreement for large machinery, ohtaining through the Secretary any information necessary to enable him to do so.

(C) *Application of the Home Market Price Provisions to Machines of Capacity up to and including 60 MW*

186. The provisions of the price agreements are operated through the Secretary. Each agreement provides that the Secretary shall obtain a copy of each enquiry or specification and that he shall prepare and circulate to tendering signatories a minimum price estimate covering the minimum equipment to meet the requirements of the enquiry. Any signatory who proposes to offer alternatives or extras for which prices cannot be determined from the schedules to the agreement, or to grant allowances on

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secondhand machinery, must submit his proposed prices to the Secretary, who must determine fair prices and circulate them to all tendering signatories; in fact, prices for non-standard extras may be obtained from specialist manufacturers of the products concerned. Where it is not possible to agree by post on any matters connected with an enquiry, the Secretary must call a tenderers' meeting before tenders are submitted to the purchaser; only those signatories who have received the enquiry are entitled to attend such meetings.

187. The prices derived from the schedules are the normal minimum prices, which in practice are treated as maximum prices. Those signatories of the Small Turbine Price Agreement (Home) who are "independent turbine builders", that is those signatories who do not also make alternators and who are not signatories of the large turbine agreements, may, however, subject to certain provisos,* quote prices 5 per cent. below the normal common minimum prices for turbines covered by the agreement. With this exception, no signatory of any price agreement may accept an order at less than the standard price except by the unanimous consent of his fellow signatories, although should such consent be refused he may apply for a final ruling to the General Manager of the Groups Joint Administration Board (GJAB). All former price agreements with the exception of that for small condensers further provided that "in exceptional cases" and by unanimous consent the maintained price of an enquiry might be higher than the standard price. This provision was never invoked and has been deleted from the current agreements.

(2) Export Market Price Arrangements

(A) *General*

188. Export price arrangements, whether operated by the Groups as in the case of machinery of less than 11,000 kW capacity or by The International Electrical Association Ltd. (IEA) as in the case of machinery of 11,000 kW capacity and above, are generally similar to the current arrangements for the home market described above, except that explicit provision is made for varying the prices in the light of market conditions.

189. The Group price agreements for small machinery for export were not formally concluded until 1953, but as we have already noted (see paragraph 164) they have been in operation effectively for all enquiries notified since 1941, prices up to 1953 being based on those obtained from the home market agreements. Before 1941 Group price arrangements on export enquiries for small machinery were rare, but machinery of 7,000 kW capacity and above was then subject to the IEA arrangements to which we refer below. With one exception, all signatories of the current home market price agreements for small machinery are also signatories of the corresponding Group price agreements for export.

190. Before 1937 signatories of the relevant IEA notification agreements agreed common minimum prices on some individual enquiries for machinery within the range covered by those agreements, namely turbines and alternators of 3,000 kW capacity and above; the prices were negotiated between

* Namely that: (i) when offering an alternator made by a "non-associated firm" (that is, a non-signatory of the Small Turbine-Driven Alternator and Generator Price Agreement) the preference shall be allowed only where the purchaser has asked all "independent turbine builders" (of whom there are at present five) to offer that make of alternator, and that the tender is submitted subject to the provisions of the small turbine/small alternator inter-contracting agreement, and (ii) at least 50 per cent. of the capacity of the turbine is used to drive an alternator.

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the parties in each case after they had tabled their individual proposed selling prices. In 1937 five signatories of the turbine and alternator notification agreements—namely The British Thomson-Houston Co. Ltd. (BTH), The English Electric Co. Ltd. (English Electric), The General Electric Co. Ltd. (GEC), Metropolitan-Vickers Electrical Co. Ltd. (Metro-Vick) and Parsons —joined to form the Turbine Plant Export Arrangement, undertaking thereby to agree minimum prices for all steam turbines and alternators exceeding 7,000 kW capacity: the Arrangement was to operate until orders totalling 1,000,000 kW had been placed with the parties. A sixth United Kingdom manufacturer, who was and still is a signatory of the notification agreements, was not a party. In 1944 the Arrangement was replaced by the Turbine Plant Export Agreement, the lower limit of the subject matter being raised to 11,000 kW. Certain further amendments were made in 1952 and again in 1955 when the current agreement was concluded: the parties remain the same.

(B) *Price Arrangements relating to Machines of Capacity up to* 11,000 *kW (Small Machinery)*

191. The obligations of signatories regarding price maintenance, the method of calculating price and the application of the price provisions are practically identical with those under the corresponding Group home market agreements.* The price schedules in the export price agreements are also practically identical with those in the home market agreements. The prices derived from the export schedules are f.o.b. prices home port for machines packed as required for shipment and exclusive of erection, and there is accordingly no percentage addition for erection in the make-up of the standard price: where erection is required the additional charge is "to be agreed in meeting or through the Secretary as circumstances demand". Some 40 per cent. of all export orders do include at least the supervision of erection and this extra is normally charged as a "rate per month". Extras for freight, insurance and other charges beyond f.o.b. are also agreed at meetings, usually in the form of percentage increases on the f.o.b. price, arrived at by compromise between the proposals made by individual tenderers in the light of their knowledge of recent actual costs for shipping similar machinery. The agreed percentage increases are not intended to include any profit element and are not subject to the schedule price factor. The schedule price factor applied for export is in each case the same as that under the corresponding home market agreement, and it is applied to the f.o.b. price as calculated from the schedules.

192. According to the Small Turbine Price Agreement (Export) the five "independent turbine builders" may quote prices 5 per cent. below the normal minimum prices for turbines up to 7,000 kW capacity provided that they have not received more than 4 per cent. of the signatories' aggregate business in that capacity range over the preceding three years. (In the home market the upper limit is 11,000 kW and there is no proviso regarding the volume of business received—see paragraph 187.) A concession is also allowed to two signatories of the Small Turbine-Driven Alternator and Generator Price Agreement (Export), who in 1950 were granted the right to

* The subject matter of the Small Turbine Agreement (Export) extends to machinery up to 16,000 kW; there is no corresponding extension under the price agreement. The extension is designed to cover the case of some builders of small turbines who, while not members of the IEA, may occasionally make for export turbines of capacity greater than 11,000 kW. Without the extension there would in such cases be no procedure for notification and no basis for subsequent price arrangements with the manufacturers concerned.

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"apply a factor through the Secretary on any specific enquiry" for alternators, the factor to apply to the schedule prices then ruling*: the concession has never been invoked.

193. From 1941 to 1954 the level of prices for home and export business was the same, except that manufacturers could with the consent of all signatories reduce the price for a particular export enquiry if by so doing they could save the order from going to a foreign competitor; this provision was invoked with increasing frequency. Since October, 1954, in order to meet foreign competition, an export selling factor has been applied to the calculated f.o.b. price for all enquiries unless signatories of the agreement agree unanimously to the contrary; the factor has the effect of reducing the level of the export price below that of the home market price. The amendment setting out this "special arrangement" further provides that where there is "serious foreign competition" and the order may otherwise be lost, and in such cases only, a further substantial reduction† on what is in effect the home market price may be agreed by the signatories tendering for the enquiry; if any tenderer wishes to make a still greater reduction he may apply to the General Manager for a "special dispensation". The Groups claim that the need to obtain the consent of a number of parties does not in practice involve any undue delay; they are not aware of any cases where orders have been lost to their members on this account. (For further discussion of the comparative level of home and export prices see paragraph 200.)

(C) *Price Arrangements relating to Machines of Capacity of* 11,000 *kW and above* (*Large Machinery*)

194. The IEA Turbine Plant Export Agreement provides that "maintained prices shall apply to tenders and orders for all plant", except that: (i) where the tendering signatories consider "that local manufacture may undermine an Arrangement they shall agree suitable safeguards . . ."; (ii) when plant covered by the Turbine Plant Export Agreement "forms part of a large composite enquiry Maintained Prices shall apply only if the Tendering Members agree prices for the whole . . . enquiry, or if they agree suitable safeguards . . .".‡ The signatories participating in an enquiry "shall agree all tendering conditions and prices", the f.o.b. basis price to include amounts for tendering and administration expenses; so far as is practicable the prices so agreed "shall be the [current] Home (Great Britain) prices for equivalent plant". Copies of the price schedules of the Group large turbine and large alternator price agreements are in the possession of the Secretary of the IEA who uses them for calculating the export price; the amount of tendering and administration expenses referred to above is the amount calculated in accordance with the Group agreements.§ A signatory of the Turbine Plant Export Agreement may require the f.o.b. prices as calculated from the home market agreements to be "adjusted to meet the particular conditions of the enquiry"; by understanding between the signatories the reduction which may be made

* The concession was granted because one of the two signatories concerned had a certain overseas customer to whom the company felt unable to apply the new price level of the agreement: the second asked on principle that a concession made to one signatory should apply also in his own case.

† When the amendment was first introduced the maximum additional reduction was less than at present. The amount of the additional reduction has since been progressively increased.

‡ A composite enquiry means an enquiry for a complete power station, including boilers and constructional work.

§ The amount subsequently paid to the Secretary of the IEA by the successful signatory of the Turbine Plant Export Agreement, however, is calculated in accordance with the Turbine Plant Export Agreement formulae. Compensation operates in all enquiries under that agreement. See paragraph 171.

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by agreement between the tenderers without recourse to a vote of all the signatories is limited to a specified percentage of the f.o.b. price for the enquiry. The provision was invoked about 20 times between 1945 and 1952, particularly on enquiries from Continental countries and Canada. Since 1952 it has been applied very frequently and the signatories have agreed that the reduction may exceed the specified percentage of the f.o.b. price if approved by majority vote of all the signatories; we are told that "competition in the export market is getting more and more fierce" and that reductions by more than the specified percentage have been agreed "on several occasions at the instance of one or other member who wishes to go all out for the job". For machinery of capacities not covered by the Group price schedules and where extrapolation is not practicable, *ad hoc* prices are agreed and such prices take into account the strength of expected competition: where as in the case of 100 MW and 120 MW sets the Groups have agreed *ad hoc* prices for the home market (see paragraph 222) these prices are taken by the signatories of the Turbine Plant Export Agreement as an initial basis for discussion.

195. Condensers are not covered by the Turbine Plant Export Agreement. The agreement provides that a lump sum price is normally to be quoted for the turbine and alternator; a separate price may be quoted for the condensing and feed water heating plant. When separate prices are quoted for the turbine and alternator, the sum of these separate prices is to be equal to the lump sum price.* Most of the enquiries notified under the three notification agreements are for complete sets comprising all three types of machinery, and in working the Turbine Plant Export Agreement the turbine builder takes responsibility for the price as a whole. Signatories of the IEA condenser notification agreement who do not also make turbines or alternators are brought into particular price arrangements, and in such cases *ad hoc* arrangements are made to cover the price of the condenser, which is derived from the schedules of the Group home market agreement for large condensers. In the event of a purchaser issuing separate enquiries for turbine/alternator and for condenser, the turbine builder would normally know of the enquiry for the condenser and it would thus be possible for him to suggest a price arrangement to cover it. It is not usual for a condenser maker who is not a signatory of the IEA condenser notification agreement to participate in such arrangements. Where a condenser maker joins a price arrangement he accepts "for the life of the transaction" obligations relating to scrutiny of tenders, minimum prices and price variations which are analogous to those under the Turbine Plant Export Agreement. Both turbine builder and condenser maker also enter into certain intercontracting undertakings (see paragraph 247).

196. All orders secured by signatories of the price agreement and by signatories of the condenser notification agreement working in conjunction with them have been at agreed prices, with the exception of one condensing plant ordered in 1946. In applying the price provisions, the lump sum f.o.b. price for the complete set is first calculated; when the option to reduce the price is exercised, the reduction is applied to the full price calculated from the Groups' schedules as adjusted by the application of their schedule price factors. All tenders and orders received are subject to scrutiny by the Secretary. Should the purchaser request some minor alteration involving a change to the agreed price, "each member invited . . . to make such modification shall submit to the Secretary his proposed price adjustment", when the Secretary "shall determine and circulate fair adjustments to all the

* Before the revision in 1955 the agreement provided that "a lump sum price for the turbine and alternator and condensing plant equipment shall be quoted". For a further explanation of "lump sum" and "separate" prices, see paragraphs 245, 247 and 248.

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interested members"; in practice the Secretary circulates a proposal, based as a rule on a similar previous case, for agreement by the tenderers. Before 1944 two of tbe five parties to the price arrangement were entitled to reduce their prices for the turbine and the alternator (but not for the condenser) by 15 per cent. "in suitable cases to enable eacb . . . to secure 10 per cent. of the business",* after which they were to quote level prices with other parties. This concession was not renewed, and no quota or automatic preference arrangements have existed since tbe conclusion of the formal agreement in 1944, althougb the question of renewing the arrangements in favour of one of the two signatories concerned was discussed again in 1950.

197. In addition to the co-operation with specialist condenser makers referred to in paragraph 195, otber manufacturers who are not signatories of the Turbine Plant Export Agreement bave from time to time co-operated with signatories in agreeing prices for particular enquiries. The current agreement provides that "a non-Member may be invited to join an arrangement if proposed by a Member and provided a majority of the Members who are parties to the arrangement approve. If a non-Member participates . . . all the provisions . . . whicb apply to Members shall apply equally to him." The corresponding provisions of earlier texts made the supply of turbines or alternators to a non-signatory contractor conditional upon the non-signatory's adherence to the price maintenance arrangement for the complete set for the enquiry concerned.†

198. Non-signatories actually co-operated on just under 7 per cent. of all business done under tbe agreement between 1945 and 1954. The proposal to co-operate in such cases came sometimes from signatories, sometimes from the non-signatories themselves; not all invitations issued by signatories were accepted. The non-signatories participated on the same terms as signatories, except that one "independent turbine builder" was permitted to quote preferential prices for two turbines both of capacity less than 16,000 kW.

199. All the arrangements described above are between United Kingdom manufacturers. Signatories of the Turbine Plant Export Agreement do not expect foreign members of the IEA to join tbat agreement and do not disclose details of the Group price schedules to foreign manufacturers: co-operation on price with foreign manufacturers could in their view only be on an *ad hoc* basis and it has in fact not taken place on steam driven macbinery in recent years.

200. The IEA does not concern itself directly with costs or profit margins. It considers that it is for the members individually to assess the reasonableness or otberwise of world price levels; tbe Association only provides the administrative framework. The Association has accordingly no information regarding the basis of the Group price scbedules which its British members use in arriving at prices for steam turbo generating machinery. Its British members would like to see the same level of prices operating for both home and export contracts. They say that in the seller's market after the war they did not tender at higher prices abroad tban they would have been able to obtain at home and that they never do so knowingly. The Group schedules are used as a guide but in practice the level of export prices for large steam generating machinery is on the whole rather below that ruling

* That is, 10 per cent. of the block of business (1,000,000 kW) to which the arrangement referred (see paragraph 190).

† The text of the 1944 agreement qualified this proviso by an exemption intended to cover the case of one "independent turbine builder", not a member of the IEA or of tbe agreement, who claimed to be able to build turbines up to 16,000 kW capacity (see also footnote to paragrapb 191).

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in the home market, although foreign competition in most export markets has been less in the case of large than of small machinery. In agreeing the price for a particular enquiry the IEA's British members bear in mind (i) the competition to be expected from non-signatories of the price agreement, (ii) price levels already established by one or more signatories in the territory concerned, (iii) abnormally onerous conditions known to be imposed by the purchaser, (iv) abnormal financial risks, (v) the terms of payment, including for example such questions as whether extended credit or the omission of a contract price adjustment clause is called for.

201. As in the case of small machinery for export, the prices for large machinery are f.o.b. prices. Where required, additional charges for freight, insurance, delivery to site and erection are agreed by the signatories, but any difference between the charges for these items included in the contract price and the cost actually incurred is adjusted as and when payment is made.

202. Although price arrangements for small and large machinery for export are administered by different bodies, there are sufficient interlocking provisions and understandings to cover marginal cases.

CHAPTER 9. STEAM TURBO GENERATING MACHINERY: PRICES TO THE CENTRAL ELECTRICITY AUTHORITY

(1) Negotiations between the Groups and the Central Electricity Authority on Prices for Turbo Alternator Sets of Capacity up to and including 60 MW

203. We have referred in paragraph 52 to the BEA/BEAMA Joint Committee set up in 1948, and to its nine sub-committees, two of which (nos. 5 and 7) were concerned with prices for transformers and steam turbo generating plant respectively. The Central Electricity Authority (CEA) (then the British Electricity Authority) has told us that it was aware at that time that the manufacturers of turbines and alternators of sizes of interest to the Authority, besides being members of the BEAMA, were also parties to price maintenance arrangements; as in the case of other similar "main manufacturing groups" the Authority therefore appointed its own representatives to join with those appointed by the manufacturers for the discussion of questions relating to prices and associated matters. Contracts for turbo generating machinery are placed by the CEA as distinct from the Area Boards, and it was accordingly the CEA which was represented on Sub-Committee No. 7. The manufacturers' side of the sub-committee consisted of representatives of the Groups concerned, who called themselves for this purpose the Associated Plant Manufacturers. The sub-committee was dissolved in January, 1954, on the initiative of the CEA. No meetings had been held since April, 1950.

204. After vesting date (1st April, 1948) the CEA at first placed its orders by allocating contracts to particular manufacturers. This was frequently done before the issue of a specification and the submission of a tender. The prices to be paid for each individual contract placed in this way were the subject of negotiation between the Authority and the particular manufacturer concerned: matters concerning prices generally, however, were discussed in Sub-Committee No. 7. The procedure of allocating contracts continued until 1954, when the Authority decided that, with the improved relation between demand and manufacturing capacity, it would give all manufacturers technically qualified and equipped with suitable capacity to

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execute the work the opportunity of tendering on each enquiry. For nearly all sets required for the Authority's 1959 programme tenders have been invited from manufacturers selected on this basis.* In Appendix 14 Table 9 we give particulars of total Central Electricity Board (CEB) and CEA plant capacity programmes in each year since 1946, together with particulars of new generating sets brought into commission by the CEA in each of the years 1949 to 1955.

205. The Authority has told us that, although at any given time there may be "assessable differences of standard of quality and performance" between individual turbo alternator sets made by different manufacturers, it would "be quite improper and wrong" to say that on average the sets supplied by one manufacturer over a long period were better than those supplied by another. The Authority has however found that some manufacturers "obtain a better availability";† also that "in bringing forward a particular design of machine" some manufacturers "will probably achieve a better efficiency" than others. Such differences in quality and design are not in themselves such as would make the Authority willing to pay different prices for machinery from different manufacturers. On the other hand it believes that differences in design between one manufacturer and another, coupled with differences in manufacturing efficiency, are such that costs will probably differ widely. For this reason the CEA considers that prices for machines of identical output and efficiency should differ, and at an early stage in the joint price negotiations it expressed the view that as prices were level it was entitled to have made available to it evidence that the prices it was charged were "fair and reasonable".

206. Early discussions between the two sides were concerned mainly with the manufacturers' methods of varying prices in relation to variations in costs, that is, with the schedule price factor component of the Groups' standard or maintained price (see paragraphs 184 and 578 to 582). In the course of these discussions the Authority was given details of the formulae for calculating a guide figure to changes in the factors, and of the returns by Group members on which the formulae are based. It was thus aware of the range of differences, as between the seven manufacturers concerned, in the respective weightings accorded to the component items of materials and labour and in the cost per unit for each of these components, although it did not know to which of the seven any particular set of figures related. At no time during the negotiations did it know the details of the make-up of the Groups' schedule prices to which the factor is applied, although it knew that price is related to the efficiency of the machine. At the present time the Authority is informed of the percentage changes in the factors adopted by the Groups from time to time, but it does not receive details of the periodic returns made by the manufacturers and it does not know how the changes actually adopted compare with the guide figure derived from those returns; neither has it details of the changes made when the formulae were revised in 1952.‡ With regard to this revision, the Groups have said that while they had themselves realised that the figures resulting from the old basis were producing anomalies, the revision resulted directly

* Contracts awarded to C. A. Parsons & Co. Ltd. are, however, still normally allocated to that company (see paragraphs 227 and 229).

† That is, the plant can be kept in commission for longer periods without the need for maintenance.

‡ The Groups contend that, although this detailed information was not passed to the CEA, the Authority was "receiving information on the profit margins on particular orders" (see paragraph 215) which, in the Groups' view, gave it "a good indication as to how a formula would work out".

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from their desire to find "an alternative basis for correcting prices more likely to find acceptance by the CEA".

207. The CEA has told us that while it knows broadly how the Groups' adjustment of prices in relation to costs works, since it does not know the details it cannot accept the method as fair. In the Authority's view such a method might be adequate for a limited period, but unless there is a new assessment from time to time and a new baseline is then taken, it ignores the effects on cost of standardisation and improved methods and increased volume of production. If prices are to be adjusted through a formula the Authority prefers the method adopted by the Transformer Group (see paragraphs 508, 615 and 618), which is based on figures publicly available; it does not, however, regard either method as ideal. In the case of turbo generating machinery the Authority itself proposed an alternative formula based on Board of Trade indexes. The manufacturers have told us for their part that they were unable to agree to the adoption of this alternative as the breakdown of cost was not sufficiently comprehensive to produce reliable results: they say that "the basis proposed by the CEA was too narrow by far" and the manufacturers' refusal to accept the CEA's proposals was as much in the Authority's interest as in that of the manufacturers themselves. The manufacturers are still debating whether "public figures" would be adequate in the case of extensive and complicated long term contracts for turbo generating machinery.

208. Attempts to find a mutually acceptable formula for adjustment continued, but little progress was made either on this or on the more general question of the justification of prices in relation to costs. The CEA has told us that "at no time was evidence of a fair and reasonable relationship between current manufacturing costs and prices produced.* The manufacturers' representatives confirmed that they operated a Price Variation Schedule [the schedule price factor, as described above] which took account of current costs† as returned by member firms from time to time and stated that prices were fixed by reference to the median of the returns. Although the manufacturers gave some information as to the weightings of different elements of cost they did not disclose methods by which design and development charges, selling expenses, administration costs, depreciation and other overhead charges were calculated"; neither did they disclose the method adopted to adjust the price "in relation to the differing efficiencies of the machines they individually offered or the extent of the profit element included in their price calculations".‡ The CEA representatives "noted that the general basis had remained unaltered since 1939". They suggested to the manufacturers that reconsideration of the whole basis was warranted by changes in (i) manufacturing technique, (ii) the size and type of turbo alternator and ancillary plant being ordered by the CEA in 1950, and (iii) the proportion of these orders comprising turbo alternators of standard size (30 and 60 MW) having standardised thermal conditions. The Groups on their side have told us that as a very large buyer the CEA "expected to get some price advantage, but the makers could not realise any savings in manufacture until the work of the standardisation sub-committee had begun to bear fruit in cutting down the range of variations in specifications

* The Groups consider that this statement by the CEA gives a "distorted picture". They submit that even if current manufacturing costs were made available to the CEA, the Authority could only use the information in two or three years' time to assess whether the price on a particular contract was reasonable.

† In fact the returns are of percentage changes in costs (see paragraph 578).

‡ The Groups submit that the CEA was offered a figure for "the average industry profit over a period of years" (see paragraph 215) and was therefore "in a position to assess whether the profit margin was excessive or not".

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they had to meet". They add that after the outbreak of the Korean war manufacturers' costs "rose steeply necessitating advances in quoted prices": the CEA "sought to resist these and previous increases, as well as querying adjustments brought about by more severe technical specifications".

209. In the meantime the number of allocated orders on which work was proceeding under letters of instruction, although quoted prices had not been formally accepted by the completion of a contract document, was accumulating. The Groups have said that by June 1950 "there were upwards of 25 turbo-alternator sets and condensing plants under manufacture, exceeding in total 1,000 MW capacity, for which tenders had not been accepted".

210. In an endeavour to end the deadlock, the two Deputy Chairmen of the CEA with three chief executive officers met representatives of the heavy electrical machinery industry on 1st June, 1950,* when they discussed the possibility of a settlement in two stages, namely (i) *ad hoc* agreement on orders already in hand, and (ii) means whereby the manufacturers might justify the level of their prices for future orders.

211. With regard to the first of these stages, in July, 1950, the manufacturers offered the CEA a rebate of 5 per cent. off their tendered prices, calculated in accordance with the agreements, on all outstanding orders for turbines, alternators and feed water heating plant and of $2\frac{1}{2}$ per cent. for condensing plant: the offer, which was accepted, was extended by mutual agreement to include contracts for 35 selected sets with a total capacity of 1,408 MW. The manufacturers have told us that "having committed a large part of their . . . [manufacturing] capacity to [the CEA] for some years ahead, in some cases at the sacrifice of desirable export business", they had little option but to accept an *ad hoc* settlement without prejudice to future negotiations "and at some financial sacrifice". With regard to the second, long term, stage the two sides agreed that each would appoint an independent firm of chartered accountants and that the two firms should work out specific proposals. These appointments were subsequently made. Although both sides kept their own notes of the meeting on 1st June, 1950, there was no agreed record and it subsequently became apparent that there was no common understanding about the extent of the information to be disclosed by the manufacturers.

212. The Groups have told us that it was their understanding that post-costing of individual contracts and submission of estimated costs on individual outstanding contracts were to be abandoned, and that justification of prices was to be based on the makers' experience of overall manufacturing costs during, say, the last three years; that is, that the CEA was to be informed of the average profit of the industry over that period. Accordingly, on 25th August they submitted a scheme on these lines, which the CEA rejected a few days later. Meanwhile, according to the Groups, at a meeting on 23rd August the Chief Contracts Officer of the CEA had made it clear to the manufacturers "that he expected to be furnished with the costs in the greatest detail of each manufacturer for all turbo-generators made for [the CEA] during the past three years". In the Groups' view this was completely at variance with anything previously discussed and constituted a complete cost investigation; the information sought went into such detail as to make it practically impossible to comply.

* This is one of the two discussions in which the Director of the BEAMA participated (see paragraph 72).

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213. Meanwhile on 1st June, 1950, C. A. Parsons & Co. Ltd. (Parsons) withdrew from membership of the large turbine, large alternator and large condenser price agreements (home) (see also paragraphs 227 to 239).

214. On 6th November, 1950, the remaining Group members offered the CEA discounts of 5 per cent. on turbines, alternators and feed water heating plant and 2½ per cent. on condensing plant, the discounts to be based on the price level ruling at September, 1950, and to apply to future business until further notice: they also undertook to maintain the September, 1950, price level, subject only to any variations due to changes in costs of materials and labour rates. The offer was expressed as being in recognition of "the contribution to economy in production now being made by the [Authority's] programming and volume of orders" and of "the greater volume of standardisation that is now prevailing". The Groups have told us that if it were possible to compare precisely the costs of two identical sets supplied before and after vesting date, "after equating all the changes in material, labour costs and so on, there is probably a slight tendency towards cheapening". They say, however, that centralised buying and the volume of the CEA's orders since vesting date have, in practice, had no very marked effect on production costs, that in their experience there is no real saving in selling costs, and that manufacturers must still maintain a big sales and technical service organisation: since the CEA has changed over from allocation to competitive tendering for most contracts, each manufacturer must produce a tender for each job. Further, "in fact the intended standardisation of 30 and 60 MW sets hardly became effective . . . Instead . . . larger and more economical sets were adopted . . . which represented a change of policy by the Central Electricity Authority": the largest sets are special designs and are in no sense "standard" (see paragraphs 138 and 222 to 226). The discount offered in November, 1950, was intended to cover the period until such time as fair and reasonable prices related to costs had been agreed. The Groups have described it to us as "an interim arrangement somewhat similar to the ad hoc settlement of July, 1950". It was accepted by the CEA on 3rd January, 1951. It should be noted here that the Group schedule price factors remained unchanged between November, 1948, and February, 1951, when they were varied following the national pay award dating from the last pay day in November, 1950.* Thus, any increases in the costs of materials and labour from 1948 to 1951 were not passed on, but were borne by the manufacturers either out of profits or by setting them against any savings in cost due to increased manufacturing or commercial efficiency.

215. In the meantime the accountants representing the manufacturers had collected from five Group members† certain information relating to 30 MW and 60 MW "standard" turbo alternator sets for contracts for the CEA or its predecessors completed in the five years 1946 to 1950 and in hand in 1951, namely: in the case of completed contracts, valued at £15 million, particulars of each manufacturer's tendered prices calculated in accordance with the Group agreements (see paragraphs 177 to 181), of his own estimated costs before the job was started and of his actual costs on each contract after completion; in the case of uncompleted contracts current at the beginning of 1951 and valued at £26 million, particulars of each manufacturer's

* The Groups have told us that the factors remained unchanged in this period because of the Government's policy "to try and hold prices". In support of this we have noted that the factors applicable under all Group agreements covering machinery in class (*b*), with the exception of the Dynamo and Motor Agreement, also remained unchanged in the same period.

† That is, from those with resources for making machinery of this size (namely the seven signatories of the large turbine and large alternator agreements) with the exceptions of one signatory who was omitted on the grounds that he had experienced manufacturing trouble which made his costs unrepresentative, and of Parsons which had withdrawn from the price agreements.

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tendered prices under the agreement and of his own estimated costs on each contract. The information was compiled initially by the staffs of the Group members concerned after they had received guidance from the Groups' accountants on the methods to be used; the results were certified by a responsible official of each company, but not by the company's auditors or by the accountants representing the Groups. On 27th July, 1951, the Groups' accountants passed to the accountants representing the CEA percentage figures showing (i) the average profit, on the basis of the original estimates of cost and the average realised profit of the five manufacturers taken together, on all contracts completed between 1946 and 1950, (ii) the average estimated profit on those contracts outstanding which were not subject to the November, 1950, discounts, (iii) the average estimated profit on the remaining outstanding contracts after deduction of discount, and (iv) the average estimated profit on (ii) and (iii) combined. They also gave particulars showing the range of profit between the five manufacturers on the completed contracts to be from about +10 per cent. to about −1 per cent. At the same time the accountants representing the Groups expressed themselves as satisfied with the costing systems employed by the manufacturers and with their methods of allocating administration and selling overheads and expenditure on research; but the information on which the overall figures were based was not disclosed and the accountants representing the CEA were not given access to any books or records. We are told by the Groups that the information supplied on estimated costs and quoted prices was obtained "in order to demonstrate to the CEA that the estimated costs upon which the quoted prices were based were reasonably accurate and that the anticipated profit had been achieved"; further, in the Groups' view, this information, together with that on estimated profits on outstanding contracts, "would give the CEA particulars of current manufacturing costs and prices in an effective manner". We discuss the levels and range of profits disclosed by these and later returns in paragraph 630.

216. On 21st August, 1951, the Groups received a reply to the effect that the CEA required figures relating to current manufacturing costs and selling prices; the reply asked for the actual average rate of profit earned by the five makers on all sets commissioned during the 12 months ended 30th June, 1951, together with the highest and lowest rates of profit earned by individual companies, and for information on the proportion of costs represented by overheads for each and the method of allocation of overheads to turbines and alternators. The Groups have told us that they considered they had already effectively supplied this information: but to meet the Authority's request they did in October, 1951, give actual average results for CEA contracts for the years 1948, 1949 and 1950, explaining that "due to considerable differences in manufacturing techniques and accounting methods etc. it was neither fair nor practicable to compare one firm's overheads with another's", but giving "a brief description . . . of the manner in which each Company allocates works overheads and general administrative and selling expenses to turbo-alternators". In passing this information to the CEA, the Authority's accountants commented that the lack of information had made it impossible for them to check any of the figures provided by the manufacturers' accountants, who had expressed the view that the capital employed and turnover of the industry were approximately in the ratio of one to one if depreciation were computed on historical costs.

217. The CEA has told us that in its view "the position disclosed was unsatisfactory" and that accordingly on 7th April, 1952, the Authority wrote to the Chairmen of two of the leading manufacturers (The English Electric Co. Ltd. and The General Electric Co. Ltd.) outlining the progress of the

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investigation since the meeting of 1st June, 1950, and emphasising "the following cardinal points which it was hoped would prove acceptable to the manufacturers:—

(i) The Accountants acting on behalf of the [CEA] should have full access to all the information which is made available by the manufacturers to their accountants so that the former can be in a position to produce a proper certificate.

(ii) The disclosure of costs should relate to individual years and the information should be as up-to-date as possible."

The Authority added that if up-to-date figures were disclosed, it "would be satisfied with a knowledge of the highest and lowest rates earned by individual manufacturers without the identity of these manufacturers necessarily being disclosed", and they expressed the hope "that the information provided by the manufacturers would also form the basis of an agreed method for adjusting the prices of turbo-generators over a limited period for variations in the costs of materials, labour rates and manufacturing conditions".

218. The Groups have told us that as correspondence between the two firms of accountants "did not produce any definite results" they themselves took the initiative in approaching the CEA again direct, and that on 14th June, 1952, they received from the Authority's Chief Contracts Officer a proposal that figures relating to 20 up-to-date contracts, mainly for sets of 30 MW and 60 MW capacity, should be jointly examined by the two firms of accountants "acting under agreed instructions from their principals. Separate *global* profit figures for 30 MW, 60 MW and other sizes were to be certified. . . . It was further hoped that sufficient detailed information could also be made available to very senior officers of the [CEA] and manufacturers to enable future price levels . . . to be negotiated." The Groups had already instructed their accountants to ascertain from members their profit figures for 1951 "on the lines of those already submitted", and on the 3rd December, 1952, their views on the adequacy of these profits were embodied in a letter to the CEA "which gave the 1951 actual profit figures . . . and should in the view of the manufacturers have met completely the [CEA's] insistence on up-to-date profit data". They decided also to make "simplified proposals somewhat on the lines of the [CEA's] plan of 14th June, 1952, but reducing the number of contracts to one only with each of five makers", the selection to be made by the CEA and "the individual certified figures to be available to the Accountants of both parties": the Groups further undertook to submit "a memorandum on the incidence of overheads and the question of an appropriate rate of profit".

219. The Groups say that on 30th December, 1952, their proposals were "summarily rejected". They believe rejection to have been due to the "period of acute misunderstanding and strained relations" through which the joint negotiations were passing following upon "genuine misunderstanding . . . regarding certain price increases". The increases concerned related to points of detail.

220. On 4th March, 1953, the Group manufacturers extended their offer of 3rd December, 1952, to cover any 20 of the 24 turbo alternator sets commissioned in 1952. At the same time they undertook to grant reasonable facilities to enable the CEA's accountants to satisfy themselves as to the basis on which the figures for cost and profit had been compiled. To this end audited cost and profit figures were to be furnished by each manufacturer to the accountants representing the Groups, who would prepare a certificate

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showing the overall profit percentage for the 20 sets: the certificate would be passed to the accountants representing the CEA, who would be given (in the Groups' words to us) "every reasonable facility to satisfy themselves" through the Groups' accountants as to the basis on which the information had been prepared. Only the overall profit percentage would subsequently be disclosed to the CEA. At the same time the CEA was also asked to accept without further inquiry the figures which had been previously submitted for the years 1946 to 1950 (see paragraph 215) and the profit which had been earned in 1951. These new proposals were accepted, although in the CEA's view they "were not entirely satisfactory".

221. In May, 1953, the two firms of accountants were instructed by their principals to proceed on this basis.* The information required was, on the instructions of the Groups' accountants, submitted in much greater detail than in previous cases and the results were certified by each member's auditor. The Groups have told us that the collection and co-ordination of the information concerned was delayed by the need to supply costing information in connection with our own inquiry, and it was not until November, 1954, that the CEA received its accountants' report on the results. The Authority has told us that it does "not regard the position disclosed by the Cost and Profit Report as satisfactory". It considers an average profit of 13 per cent. on cost as disclosed by the report "too high" and believes "that because of the many favourable changes which have taken place since the period 1950–51–52, during which these sets were manufactured and erected, the rise in manufacturing costs will not have kept pace with increases in National Engineering Wage Rates and the cost of materials". In that period the manufacturers concerned, with one possible exception, "have increased and improved their manufacturing capacity devoted to work of this kind, have installed substantial quantities of modern machine tools and other manufacturing equipment, have benefited from the policy of standardisation of sets which the Authority has followed, have received far more regular and stable supplies of materials, have largely stabilised their labour forces and have reduced manufacturing and erecting times by a period of approximately twelve months. The Chairmen of some of the principal companies concerned have indicated to the Full-Time Members of the Authority the possibility of fresh negotiations but so far have not put forward any sufficiently concrete proposals to enable the Authority to judge whether they could form the basis of a satisfactory arrangement." It is the CEA's intention to seek justification of prices in relation to costs also in the case of larger machinery and particularly sets of 120 MW and 200 MW capacity "which are likely to become the backbone of the Authority's programmes for some time to come". The Groups have told us that "discussions are proceeding with the CEA in an endeavour to reach a satisfactory trading agreement".

(2) Prices for Turbo Alternator Sets of Capacity over 60 MW

222. The price schedules in the agreements do not cover turbines and alternators of capacity exceeding 60 MW (see paragraph 176). The Groups have told us that for the latest and largest reheat turbines and alternators of 100 MW, 120 MW and 200 MW required by the CEA the general practice is to agree *ad hoc* standard prices after each manufacturer has tabled his suggested selling price based on his own estimate of cost. Prices have in

* The sets selected by the CEA for costing comprised:—

30 MW	9 sets	50 MW	1 sets
31·5 MW	2 sets	52·5 MW	2 sets
32 MW	1 set	60 MW	3 sets
45 MW	2 sets		

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practice been agreed by this method for turbines and alternators of 100 MW and 120 MW. In the case of turbines and alternators of 100 MW capacity the *ad hoc* prices were checked against prices calculated by extrapolation from the price schedules (see paragraph 176): for technical reasons a similar check was not found appropriate in the case of machinery of 120 MW. The prices of the condensers for both 100 MW and 120 MW sets were calculated from the price schedules. Similar discussions have also taken place on the prices for 200 MW sets, but agreement was reached only on prices for the condensing and feed water heating plant. The development of these large machines has taken place at a time when Parsons, although no longer a signatory of the relevant price agreements for the home market, has continued to fix its own prices by reference to Group prices (see paragraphs 213 and 227). This circumstance has made the negotiations between the manufacturers to agree *ad hoc* prices more difficult than they might otherwise have been.

223. The method of agreeing prices for these larger turbines and alternators can be illustrated by reference to the 120 MW sets. Up to December, 1955, the CEA had placed orders for nine turbo alternator sets of this capacity for use at six generating stations, all to a basic specification discussed and agreed with the manufacturers. Of the nine sets ordered, six were allocated by the Authority to individual manufacturers and three were placed after the receipt of tenders from more than one manufacturer. When the first two allocations were made at the end of 1952, all the signatories of the price agreements covering large turbo generating machinery, with Parsons, met to discuss the basis of prices. Five of the six signatories of the large turbine and large alternator price agreements and Parsons then tabled proposed selling prices per kW ;* the capacity of the machinery was beyond the manufacturing range of the sixth signatory who for this reason did not table proposals. The highest proposed price per kW was 8 per cent. above the lowest in the case of the turbine and 7 per cent. above the lowest in the case of the alternator. In both cases the agreed price per kW was the average of all proposals submitted. Later (in December, 1954) the signatories agreed an alternative price per kW for alternators to an amended specification. For this purpose four of the signatories tabled revised proposals; the agreed price, reached after considering both the average and the median of the proposals, was slightly above the average and very slightly below the median. The alternative represented a saving of some 1½ per cent. on the price of the alternator. Parsons did not take part in these later discussions.

224. All the prices agreed were minimum prices subject to adjustment for improvement over specified minimum performance, the amount of such adjustment being calculated in accordance with the appropriate formulae and percentages scheduled in the price agreements (see paragraph 178). The Groups have told us that subject to adjustment in accordance with changes in the schedule price factors they have formed the basis of all prices for 120 MW sets quoted by signatories to the CEA. They are subject to discounts usually allowed by the Group manufacturers to the Authority, namely 5 per cent. on the prices of the turbine, alternator and feed water heating plant and 2½ per cent. on the price of the condenser (see paragraph 214). Parsons "established" a price calculated on the same basis with the Group Secretary for the first order allocated to the company, but gave no undertaking with regard to any discounts which the company might allow beyond saying that its price basis for 120 MW sets would not be "materially different" from that of the other manufacturers; the Groups have no knowledge of the prices which Parsons finally quoted (see also paragraph 231). Up to December,

* One of the five signatories did not table prices for the alternator.

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1955, orders had been placed with three of the six manufacturers concerned, including Parsons.

225. The CEA has told us that in the case of 200 MW sets the Authority first discussed designs with four manufacturers. Following these discussions the CEA issued a specification and invited these four manufacturers to submit tenders for the turbine and alternator. On receipt of the enquiry the Group appointed a committee of five manufacturers, including Parsons, to suggest selling prices per kW. The highest price per kW suggested by any of the five was 34 per cent. above the lowest in the case of the turbine and 62 per cent. above the lowest in the case of the alternator. It was intended that the prices to be agreed for these machines should be net minimum prices, not subject to the Groups' 5 per cent. discount or to any other reductions, and that the level agreed should apply to all future orders for similar machines.* Parsons was unwilling to co-operate on this basis. In consequence one of the signatories also withdrew and the negotiations broke down. Prices for the corresponding condensing and feed water heating plant, based on the approximate average of figures tabled by the four and three tenderers respectively concerned, were agreed. On subsequent orders for the second and third sets discounts of 2½ per cent. on condensing plant and 5 per cent. on feed water heating plant were also agreed. Parsons took part in both discussions and submitted proposed selling prices which were taken into account when calculating the averages.

226. Up to December, 1955, orders for three complete turbo alternator sets of 200 MW had been placed, all with The English Electric Co. Ltd. (English Electric). The CEA has told us that there was considerable difference between the lowest and highest prices quoted for the first set and there were substantial technical differences in the designs offered by individual manufacturers; each put forward alternative offers for (i) cross compound and (ii) tandem compound sets. The order was placed with English Electric after "a careful assessment of the economics of the various offers" which took into account "not only the capital cost of the various alternatives, but also the annual operating costs, cost of buildings required etc. so as to establish their relative commercial values. In the overall economic assessment there was little between English Electric" and another Group member, "and the decision in favour of English Electric was therefore finally on engineering considerations". English Electric's price was not the lowest. The company subsequently offered a discount of 5 per cent. for the second and third turbines and alternators for the same station if ordered immediately, as well as the discounts agreed within the Group (see paragraph 225) for condensers and feed water heating plant. The discount on the turbines and alternators, like the price for the original set, was agreed independently by English Electric with the CEA.

(3) The CEA and Parsons

227. On 1st June, 1950, Parsons gave notice of its intention to withdraw immediately from the price agreements covering large machinery in the home market. The company then entered into a separate arrangement with the CEA, particulars of which are described below. The company does not usually tender on CEA enquiries in competition with Group members, but where exceptionally it has been invited to quote competitively, it has done so in co-operation with the Groups. It has continued to co-operate with the Groups on prices for all enquiries from purchasers other than the CEA. When

* The Groups have told us that it was in fact agreed with the CEA that the discount should not apply to 200 MW sets and that this was "therefore not a unilateral decision by the manufacturers".

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the company co-operates it acts in all respects as if it were a signatory of the price agreements, but it attends only those tenderers' meetings which are concerned with enquiries on which it co-operates. As a signatory of the notification agreements it attends all Group meetings, including meetings concerned with the provisions and operation of the price agreements, although it is sometimes asked to withdraw when discussion relates to prices to the CEA; in the case of special meetings specifically concerned with price policy, price levels or discounts to the CEA, the company would not be invited to attend and it would not necessarily know that such meetings had taken place. The company knows the make-up of the price schedules in the agreements and the level of Group members' prices as calculated from those schedules and it continues to make returns for the purpose of calculating permissible variations in the schedule price factor and to participate in discussions as to whether the resulting guide figure* or some lower figure shall apply; but it would not be aware of any departure from the price schedules which members might agree between themselves in calculating the prices for individual CEA inquiries, nor would it necessarily be aware of any discounts or other allowances which the Groups might offer the CEA. For home market enquiries for large machines other than for the CEA the company has obtained the Group price from the Secretary and has quoted in all respects as though a member. Since the compensation provisions are in the notification agreements of which Parsons is still a signatory, Parsons continues to participate in compensation arrangements on CEA contracts (see paragraph 169).

228. After giving notice of withdrawal the company communicated with the CEA, and on 10th July, 1950, the Chairman of Parsons met the Authority's representatives. Some weeks later, in consideration of the size and regularity of the orders and the degree of "standardisation" achieved, Parsons offered the Authority terms substantially more favourable to the Authority than the Groups' terms on all orders for large turbines, alternators and feed water heating plant placed after an agreed date in 1950, all such orders being in fact at that time for 30 MW and 60 MW sets; Parsons also offered that in certain events it would review its terms in favour of the Authority.

229. In September, 1950, the offer was accepted by the CEA, which in turn undertook to allocate to the company orders for a specified substantial volume of machinery a year so long as the Authority's total programme did not fall below a certain level. The arrangement was to be operative for all machinery for commissioning up to a certain date.

230. Subsequently both Parsons and the Group manufacturers claimed price increases based on increased costs and in the meantime the Groups had also introduced the rebate of November, 1950 (see paragraph 214). When in 1952–53, owing to progress in standardisation, the CEA was able for the first time to compare the level of all manufacturers' prices for "similar steam turbines and alternators to a common specification and to the same extent of contract", the difference disclosed between Parsons' figures and those of Group members was less in the CEA's view than it should have been, bearing in mind the reductions allowed by both and the relative increases in costs claimed (see paragraph 582). After the Authority had brought this fact to Parsons' notice, the company discovered that without its knowledge the Groups had reduced, for CEA quotations, the price increase for improved turbine efficiency (see paragraph 179). Parsons has told us that "in keeping with the spirit of the agreement with the [CEA] to review prices from time to time" and on representations from the Authority

* See paragraph 578; paragraphs 184 and 206 also refer.

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the company offered, and the Authority accepted, a further *ad hoc* reduction on the price for every 60 MW set quoted since 31st December, 1951. The CEA has told us that " in consideration of this reduction " it " undertook to continue the arrangement entered into in September, 1950 . . . for a further indefinite period ".

231. We have so far considered primarily Parsons' prices to the CEA for turbo alternator sets of 60 MW capacity and under: that is for those sets which in the case of Group members are initially priced in accordance with the schedules of the relevant price agreements. It is relevant here to describe briefly the course of Parsons' negotiations with the CEA on larger machinery. We have already referred (in paragraphs 222 to 226) to the fact that Parsons has taken part in Group discussions relating to *ad hoc* prices for such machinery. On 100 MW sets and on the first 120 MW set Parsons quoted terms more favourable to the CEA than the Groups' terms. Shortly after the submission of tenders for the 120 MW set, Parsons was informed by the CEA that the differential between the company's price and the first price tendered by another manufacturer for a similar allocated contract was smaller than the Authority had expected. As a result of the CEA's representations, in July, 1954, Parsons offered a further reduction of a significant amount on all orders for 120 MW sets placed with the company thereby, according to the CEA, re-establishing the differential between the company's prices and those of the Groups. Parsons has pointed out to us that whereas the original concession was related to savings in costs, these savings do not apply in the case of larger sets which are not yet in any way standardised or ordered in quantity, and has commented that " it would be a natural assumption to make that the [Group] firm in question had effected some reduction [below the agreed Group level as known to Parsons] in an endeavour to test out " Parsons' own level. The Groups on the other hand have told us that the signatory concerned was not authorised to offer any additional allowances.

232. In accordance with the terms of the 1950 arrangement between Parsons and the CEA, a review of the company's prices in the light of costs actually incurred took place in April, 1955. As a result, and having regard to the substantial profits earned, the company offered the CEA further significant reductions on future orders for 60 MW and 120 MW sets and in the case of 120 MW sets it indicated its willingness to apply this additional reduction retrospectively to cover all 120 MW sets ordered from it. In the case of 60 MW sets the company offered a retrospective reduction on all contracts placed on or after 1st January, 1952.

233. We have asked the CEA whether the Authority's undertaking in the arrangement of September, 1950, has resulted in Parsons obtaining a larger proportion of total capacity ordered than previously. The Authority has replied that in years when it has had to restrict its orders because of the relation of manufacturing capacity to demand, Parsons received a larger share of orders than it would otherwise have done in those circumstances and that in the Authority's opinion the company has now probably the biggest share:* the company would certainly get a *pro rata* share of any increase over 1,500 MW in the volume of annual orders placed and it has the added advantage of a known minimum block of business and can plan with the certainty that a growing volume of output will be absorbed. Parsons for its part has commented that if the CEA ceased to guarantee the " solid block ", it would be to the company's interest to go back to Group prices.

* In the company's view however, taking " the total kilowatt to be commissioned from 1956 to 1959 . . . inclusive ", this is not the case.

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234. It remains to consider Parsons' reasons for leaving the Groups and coming to a separate arrangement with the CEA, the effects of the company's action, and the company's attitude to price arrangements generally.

235. Parsons has told us that it withdrew from the agreements "due to a difference of opinion over the level of prices which should be quoted to" the CEA. The company concurred with the Authority's view that the volume of orders for "what was virtually standard and repeat plant" must result in a saving in manufacturers' costs at least insofar as drawing office and tendering expenses were concerned, and had already informed the other Group memhers concerned that it wanted a reduction on prices to the CEA of at least 6 per cent. for turhines, alternators and feed water heating equipment. The other members did not at that time agree that a reduction was justified and Parsons admits that some of the other memhers may not have been "in quite such a happy position" for giving a discount. The CEA was exerting "terrific pressure" and Parsons thought that the Authority had a good case; the company felt also that the manufacturers might he open to public criticism if they did not make some concession and was aware of a rumour that the CEA had authority to buy "one or two machines overseas". Parsons has told us that when it gave notice of withdrawal it was not influenced by any offer of terms from the CEA; the arrangement between the company and the Authority was negotiated after the withdrawal had taken place.

236. The Groups have said that formally they know of no reason for Parsons' withdrawal. Parsons on some earlier occasions had taken the view "that the lowest possible price should he used" and it might be correct to infer that in Parsons' opinion Group prices to the CEA were too high. The minutes of the Groups record that at the time of its withdrawal Parsons stated that the company had not departed from any obligations entered into whilst a memher, that its recent quotations to the CEA had been at full "document" price and that the company would adhere to these quoted prices, hut that did not mean that the company would not reduce its prices by 6 per cent. the following day on future enquiries if it wished to do so. The Groups are not aware of the terms of the arrangement between Parsons and the CEA, but they have told us that there have heen "clues and hints" that Parsons was doing very well and in their view the company has on the whole "somewhat improved [its] position" since its withdrawal. The Groups regard Parsons' resignation as "very unfortunate . . . and therefore . . . the door has heen kept open for them as far as possihle in the hope that they would return".

237. Finally the CEA has expressed the opinion that Parsons withdrew from the price agreements (i) to ensure that a rapidly growing output would be ahsorhed, (ii) hecause the company might find it difficult to justify its level of profits if called upon to do so, and (iii) "from a very definite feeling . . . that the Authority was in a special position" hoth hy virtue of the very large proportion of the machinery manufacturing industry's total output which it ahsorbed and would continue to ahsorh and because the Authority was responsihle for a very large measure of standardisation with resulting savings. When Parsons found it impossihle to persuade the other manufacturers to accept this view, it withdrew. The Authority continues that it had failed after two and a half years to persuade the manufacturers to accept the reality of the savings resulting from its purchasing policy and "the suggestion was made that we should try and see if one manufacturer would hreak away on his own, and this was the result . . . Within a matter of weeks the others virtually followed suit" by reducing the Group prices.

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238. The CEA has no doubt that Parsons' action has had the effect of stopping the other manufacturers' prices from rising as rapidly or as much as they would otherwise have done. The Groups themselves have assured us that their decision to offer discounts in November, 1950, was not directly influenced by Parsons' withdrawal.

239. Parsons has emphasized to us that it "firmly believe[s] in Group and level prices" and "did not want to break [the system] up". Since its withdrawal the company has adhered to Group prices "on every single job" other than for the CEA and for that reason has continued to notify enquiries and orders: it "would have been extremely unfair to the members to take advantage of the position established with the [CEA], to quote reduced prices to other people"; the Authority "made out a good case for a reduction", but no similar case existed for other buyers. The company adds that other buyers "are not large enough to press their point sufficiently and in any case [the machines they buy] are usually complicated machines of a smaller size and each one is different". In Parsons' view "it would be disastrous from everybody's point of view", including the CEA's, if there were no home price agreements at all: there would be price cutting from those short of work "and inevitably and subconsciously the more you bring the price down the worse the job the buyer gets". The manufacturers should meet competition "by reducing group prices in collaboration with members to meet the competition".

CHAPTER 10. STEAM TURBO GENERATING MACHINERY: HANDLING CHARGES AND INTERCONTRACTING

240. We have explained in Chapter 6, sections (3), (4) and (5), the contractual pattern usual for the main component machines of a turbo alternator set, the extent to which signatories of the various agreements make all the types and capacity ranges of machinery, and the obligations and understandings governing membership of the separate agreements covering related machinery. These matters are relevant to an understanding of the arrangements described below.

241. The main component machines in a particular turbo alternator set may be made or supplied by more than one manufacturer. This would usually occur either because the purchaser specified different manufacturers for the different machines (when he might or might not issue separate enquiries and place separate contracts), or because the main contractor did not himself make—or, exceptionally, did not wish to supply—all the kinds of machine covered by the enquiry; where the manufacturer took the initiative in supplying machines not of his own make in conjunction with his own, the purchaser would have knowledge of the fact.* Whoever the actual manufacturer may be, it is usual for turbine and alternator to form part of a single contract, which may or may not also include the condenser. An enquiry covering both turbine and alternator normally goes in the first place to the turbine builder, who is then responsible for co-ordinating the work as a whole. The condenser maker may tender direct to the purchaser, although in the case of small machinery he generally in practice tenders to the turbine builder.

* The Institution of Electrical Engineers' (IEE) Standard Conditions provide that: "The Contractor shall not, without the consent in writing of the Engineer, which shall not be unreasonably withheld, sub-let the Contract or any part thereof, or make any sub-contract with any person or persons for the execution of any portion of the Works other than for materials, for minor details, or for any part of the Works of which the makers are named in the Contract". There is no parallel provision in the less comprehensive BEAMA Conditions.

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242. The Groups cover this form of intertrading by intercontracting agreements between the turbine builders and the alternator makers and between the turbine builders and the condenser makers and by an associated system of main contractors' handling charges (formerly called main contractors' discounts). Each intercontracting agreement is a separate and self-contained document, to which the signatories of both the relevant main agreements (that is the price agreements) adhere; it is included as a schedule in both the main agreements and its provisions apply to all enquiries covered by the main agreements. The subject matter of each intercontracting agreement covers that of the two main agreements to which it is related, and the arrangements as a whole are administered by the same Secretary. Each main agreement binds its signatories to observe their obligations under the intercontracting agreements. Although The International Electrical Association Ltd. (IEA) Turbine Plant Export Agreement contains no provisions for intercontracting between turbine builder and condenser maker, appropriate provision is made in the tendering instructions issued by the Secretary for each enquiry.*

243. The arrangements have little practical significance where the same concern makes and supplies turbine and alternator or turbine and condenser. It follows that arrangements between turbine builder and alternator maker are of greater importance in the case of small machinery where not all members of the price agreements make both types of machine, than in the case of large machinery where all turbine builders are also alternator makers; and as regards small machinery they are in some respects of greater importance in the export than in the home market. There are specialist concerns making condensers of all sizes but not the corresponding turbines, so that as between turbine builders and condenser makers intercontracting arrangements are of significance for large as well as small machinery. Arrangements covering intercontracting and handling commissions were first introduced by the Groups in 1915. The Groups have estimated that intercontracting occurs on perhaps 10 per cent. of all business done by Group members.†

244. Each current Group price agreement relating to alternators and condensers provides that the prices derived from its schedules and the prices for non-standard extras shall be held to include a handling charge of 5 per cent. to the turbine builder main contractor when he is a signatory of the relevant turbine price agreement:‡ the main contractor is not entitled to pass on the amount of his handling commission to the purchaser. The Turbine Plant Export Agreement also provides that where a condenser maker joins a price arrangement (see paragraph 195), all prices quoted to the turbine builder shall include a 5 per cent. handling commission. There is no direct relation between the sums yielded by this percentage commission and any

* Intercontracting between turbine builder and alternator maker would not normally arise under this agreement as all signatories make both types of machine (see also paragraph 243).

† The Groups estimate that in the eight years 1946–1953 intercontracting arrangements operated on roughly one-fifth of signatories' total home market business in small turbines and small alternators and in large turbines and large condensers, and on one-third in the case of small turbines and small condensers: the large turbine/large alternator intercontracting agreement has operated only two or three times in recent years when the purchaser specified a turbine of one make and an alternator of another.

‡ Similarly the turbine price agreements provide that prices derived from the schedules include a 2½ per cent. handling charge to alternator or condenser maker main contractor: in practice this has no significance since in neither of those capacities would a manufacturer act as main contractor with the turbine builder as sub-contractor. As the turbine is the most expensive part of the set, the cash value of 2½ per cent. on the turbine price may be roughly equivalent to that yielded by 5 per cent. on the price of alternator or condenser.

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additional costs actually incurred by the main contractor. The Groups have told us that a turbine builder may in fact suffer a loss through handling a contract and that it is in their view very doubtful whether the commission he receives covers his expenses.

245. Where separate contracts are placed for turbine and condenser, the turbine builder still receives a handling commission from the condenser maker if both manufacturers are parties to the relevant price arrangements; thus, the purchaser pays the full price for the condenser, including the handling commission, even though he has not formally recognised the turbine builder as the main contractor. The small turbine price agreements also provide that when a signatory quotes separate prices, as distinct from a lump sum price, for turbine and alternator (that is in effect when he quotes his own machinery in conjunction with related machinery of non-signatory manufacture), the home price for the turbine as calculated under the agreement must be enhanced by 5 per cent. and the export price by 3 per cent. This addition to the price is intended to ensure that, if a separate contract is placed for the alternator with a non-signatory manufacturer, the turbine builder will nevertheless be compensated for his work in co-ordinating the operation of the two units and for the risk of guaranteeing the performance of his turbine when coupled with an alternator made by a non-signatory, possibly a foreign manufacturer. The Groups have pointed out to us that as the efficiency of the turbine is judged by the output of the alternator, the turbine builder might incur penalty for failure to achieve guaranteed performance* when his machine was coupled to an alternator of inferior design or workmanship. They say also that once an order which involves a turbine and alternator on the one hand and a condenser made by a different manufacturer on the other has been placed, the liaison between turbine builder and condenser maker is very close whether the purchaser awards separate contracts or a single contract for the whole set.

246. The Groups' intercontracting agreements are all generally alike though differing in detail according to the type and size of machinery and the range of production of the manufacturers concerned; and all Group and IEA intercontracting arrangements are concerned in the first place with the maintenance of agreed prices for the set as a whole, more especially where the component machines are made by more than one manufacturer, and in the second with terms and conditions of supply of machinery as between (i) signatories of price arrangements, (ii) signatories of price arrangements and non-signatories, (iii) the manufacturer and the purchaser. The current intercontracting arrangements are not exclusive, that is they do not prohibit signatories either from offering machinery made by non-signatories in conjunction with their own or from supplying their own machinery to a non-signatory, although signatories are under varying degrees of obligation to give preference to, or secure the appointment as co-contractors of, other signatories.

247. In the case of large machinery supplied in the home market, the turbine/alternator intercontracting agreement provides that its signatories shall offer machinery of non-signatory make only on prior notice and "in rare and exceptional cases". Signatories must normally quote a "combined price" (that is, the sum of the standard or maintained prices for turbine and alternator calculated respectively according to the large turbine and large alternator price agreements).† Handling charges apply where a single

* See also paragraph 257 for particulars of performance guarantees and penalties.

† The Central Electricity Authority told us, however, that it "automatically gets a breakdown between turbine and alternator".

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contract for turbine and alternator is placed, but not, under the current text, where separate contracts are placed. The corresponding large turbine/condenser intercontracting agreement provides that those signatories who make only turbines or condensers shall, when tendering for machines of the type they do not make, preferably offer machines made by another signatory and that they shall use their "utmost endeavours to secure the acceptance" of signatories as co-contractors. The provisions of this intercontracting agreement differ from those of the corresponding intercontracting agreement governing alternators in that all signatories (including those making both turbines and condensers) must submit separate prices for each of the two machines; they differ also in that handling charges operate irrespective of whether a single contract is placed for turbine and condenser or whether the two machines are each the subject of separate contracts* (see also paragraph 245). There are no comparable arrangements between makers of large turbines and large alternators for export (see paragraphs 242 and 243), but condenser makers who undertake to co-operate on a particular enquiry with the parties to the Turbine Plant Export Agreement undertake that the prices quoted by them "to any other person" shall be "strictly net and . . . not . . . less than [the] minimum . . . obtained from the arrangement" (see paragraph 195).

248. Intercontracting arrangements for small machinery both for home and export are generally similar to those relating to large machinery in the home market; as in the case of large condensers, where separate contracts for turbine and condenser are placed handling commission is payable. In the case of small turbines and small alternators, however, the provisions are more detailed than in the case of large machinery, mainly because "independent turbine builders" (see paragraph 187) wishing to offer sets of a capacity exceeding about 7,000 kW are dependent for the supply of the alternator on the "combined builders" (that is, those signatories who make both types of machine). These combined builders will in some cases themselves be tendering for the same enquiry and may be unwilling to supply the alternator to another turbine builder, particularly as orders for alternators only might unbalance their own manufacturing capacity. The general effect of the more detailed provisions applicable to small machinery, where they differ from those for large machinery, is to place some obligation on the combined builder to supply alternators to the "independent turbine builder" whenever possible on a basis which will allow the "independent turbine builder" to compete on equal terms with the combined builder if the latter is also making a direct quotation, while leaving the "independent turbine builder" free to offer machinery made by a non-signatory if he fails to obtain a competitive tender from a signatory. In the latter event the "independent turbine builder" must give notice of his intention "within a reasonable time" and must quote segregated prices for turbine and alternator. The price for his own machinery must then be the maintained price and that for the machinery of non-signatory make not less than net cost to him increased by 5 per cent. handling commission; he must also be prepared to act as sub-contractor to any other signatory for the machinery of non-signatory make at the price named in his tender to the purchaser, including handling commission. Under the provisions of the main price agreements relating to small turbines he would also when quoting segregated prices add to the price of the turbine 5 per cent. in the case of home market quotations or 3 per cent. in the case of those export quotations where it is known that the purchaser

* The current arrangements operate only in cases where both turbine builder and condenser maker are signatories of the agreement; the former text provided also for payments into the agreement funds where one manufacturer was a non-signatory.

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will place separate orders,* and he would lose his 5 per cent. preference (see paragraphs 187 and 192).

249. The provisions of intercontracting agreements operating before the revisions of 1952–53 were in some respects more stringent.† Signatories acting as co-contractors with non-signatories not only forfeited any handling commission which might otherwise be payable but were also supposed to pay what amounted to a fine into the agreement funds, though in practice such payments were never made. Under agreements relating to large machinery the signatory concerned also forfeited a further special discount together with the right to pass this discount on to the purchaser, and might thus find himself in a disadvantageous competitive position in relation to other signatories offering machinery all of which was made by signatories.

250. We have asked the Groups the purpose of their intercontracting arrangements and whether they might not have the effect of deterring signatories who might contemplate resigning from the main agreements from doing so. The Groups have replied that "the Intercontracting Agreement in its original form was framed to counteract the practice of the foreign turbine builders buying British alternators and condensers and competing in the British home market and obtaining orders by virtue of a low price on the turbine". They have also told us that in the 1930's it was comparatively easy to buy foreign alternators, so that a United Kingdom turbine builder, in order to obtain any business at all, might have found himself obliged to quote in a way which would enable the purchaser to couple a United Kingdom turbine to a foreign alternator. The present agreement, however, was not drafted with a view to discouraging such transactions. "Its intention was to afford maximum means for co-operation between signatories. While the terms of the Intercontracting Agreement could be interpreted as a deterrent to signatories who might contemplate resigning from the Agreements it was not the intention, and the terms of the Agreement have never been regarded in this light by the signatories." At the same time they have agreed that the arrangements as a whole have the effects first of ensuring that there is an agreed minimum price for the complete turbo alternator set, secondly of deterring signatories who do not make the complete set on the one hand from coupling their machines to those of non-signatories and on the other from leaving the price agreements, and thirdly of ensuring that however the purchaser may choose to place his order, and however precise his specifications may be, he has in the case of the condenser to pay a charge, being a fixed proportion of the price of the plant, for the manufacturers' co-ordinating services.

251. The manufacturers' arrangements are ultimately dependent upon the purchaser in that it is the purchaser who decides how contracts shall be awarded. The Central Electricity Authority (CEA) has adopted a standard practice of placing separate contracts for (i) turbines and alternators, (ii) condensers, and (iii) feed water heating plant. The Authority has told us that its standard specifications "were evolved in collaboration with the manufacturers" and clearly define the extent of each item, so that a separate contract can be let direct to the actual manufacturer of each machine. Bearing in mind that the Groups' handling commission is payable to the turbine builder where a separate contract for the condenser is placed and that the price of the condenser to the purchaser is deemed to include provision for

* There is no percentage increase for export orders where the purchaser places a single order for both machines.

† The status of the former small turbine/small alternator inter-contracting agreement is obscure; it was never formally completed and two versions existed. Intercontracting arrangements were, however, operated.

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such payment, we have asked the Groups whether the emergence of a single main buyer of large machinery in the home market has in any way reduced the amount of co-ordination which they claim the turbine builder must undertake, whether it is an effect of the intercontracting arrangements that the same price is charged for a turbo alternator set even if supplied in circumstances where the services which the handling charge is intended to cover are not required, and more specifically whether this is the case in CEA contracts. The Groups have replied that the CEA's purchasing methods have not affected intercontracting arrangements for large machinery at all, and that the amount of co-ordination which the turbine builder must always undertake in connection with any complete set is unchanged. The CEA for its part believes that, either directly or through its consulting engineers, it takes a more active part than its predecessors in co-ordinating the work of the various contractors both in the factory and during installation, but it does not dispute that a special responsibility still devolves upon the turbine builder.

CHAPTER 11. STEAM TURBO GENERATING MACHINERY: OTHER GROUP AND INTERNATIONAL ELECTRICAL ASSOCIATION LTD. ARRANGEMENTS

(1) Conditions of Sale and Contract and Related Provisions

252. We have described in Chapter 5 the arrangements for standard conditions of sale and contract as applied generally to machinery covered by our reference: we are concerned here only with their detailed application under the Group and International Electrical Association Ltd. (IEA) agreements relating to steam turbo generating machinery in class (*a*). Most contracts for this machinery cover erection (although in export contracts the manufacturer's services may be confined to supervision) so that of the sets of standard conditions reproduced in the BEAMA "Brown Book", those including erection are usually the appropriate ones. The arrangements of the Groups and of the IEA extend the operation of the "Brown Book" first by making the use of one or other of the alternative sets of standard conditions obligatory for their members in certain cases and subject to certain provisos, and secondly by elaborating certain clauses. The general effect is that where members agree common minimum prices they also offer identical conditions of contract and must agree any subsequent variation with other members tendering on an enquiry.

253. In the home market signatories of Group agreements relating to both large and small steam driven turbo generating machinery are obliged under the terms of those agreements to observe "the rules" for the use of conditions of sale and contract set out in the BEAMA Council's "Instruction to Members". In the export market, Group agreements relating to small machinery provide that unless the purchaser puts forward any general conditions with his enquiry tenderers shall, unless otherwise agreed among them, tender either the appropriate BEAMA Standard Conditions or those of the professional institutions: when the purchaser does issue a set of general conditions, tenderers are to decide whether these conditions are acceptable, whether they should be modified or whether tender and contract shall instead be made subject to one of the "Brown Book" standard models. In the case of large machinery for export (prices for which are agreed within the IEA), the Group notification agreements provide only* that "every Signatory shall conform . . . to any . . . obligations . . . agreed

* Apart from a provision relating to repair contracts.

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with the tendering Signatories on any particular enquiry". We have already noted in Chapter 5 that there are no provisions relating to contract conditions in any IEA agreement; the members concerned in a price arrangement do, however, discuss and agree the conditions which shall operate on any particular enquiry, and the procedure followed is generally similar to that of the Groups concerned with export prices. The IEA has told us that where steam turbo generating plant is concerned obligatory uniform conditions of contract are "purely a corollary to the fixed prices".

254. Under the Group agreements covering small machinery,* and under those covering large machinery in the home market, signatories must stipulate progress payments during manufacture in all tenders or contracts of a value of or exceeding £50,000 in the case of the home market or £100,000 in the case of exports. The agreements concerned specify the proportion of the price which must be paid during manufacture at the contractor's factory, namely 60 per cent. in three instalments of 20 per cent. each. Thereafter the balance up to 80 per cent. is to be met as and when the machinery is delivered from time to time on site (or in the case of exports, as and when shipped), and the remaining 20 per cent. in accordance with the appropriate clause of the BEAMA or Institution of Electrical Engineers' (IEE) Conditions used. These provisions are, however, qualified in the current Group home market agreements. Those concerned with small machinery provide that "where a signatory is unable to obtain these . . . payments in the contract, he shall give three days' notice to the Secretary that he intends to waive these payments", when all tendering signatories shall be free to do the same. In the case of large machinery the provisions do not apply to contracts for the Central Electricity Authority (CEA) (which constitute the greater part of signatories' home market business in large machinery), but progress terms of payment in a form agreed with the Authority are applied. Group agreements covering exports of small machinery provide for some flexibility in applying the terms specified where the purchaser will not accept them in the form first offered, but do not expressly state that the provision may in such circumstances be waived completely. The minimum value of contracts to which progress terms of payment have been applied has varied from time to time: the present export minimum of £100,000 was introduced in March, 1955, the level before that date being £50,000.

255. Although there is no express provision under most agreements, the signatories of the Group agreements and of the IEA Turbine Plant Export Agreement have included one of the BEAMA "Brown Book" Supplementary Clauses relating to contract price adjustment in the conditions quoted for home and export contracts since 1950. Until recently contract price adjustment has usually operated without a ceiling limit (see paragraph 120).

256. There is no provision in any of the Group agreements regarding the delivery dates to be offered on an enquiry and the Groups have told us that there is no understanding between the signatories on this matter. Agreement on the minimum delivery period to be offered is a feature of all price arrangements under the IEA, the period adopted being the shortest proposed by any party to the arrangement for the particular enquiry.

257. In addition to the provisions described above, all the relevant Group agreements lay down instructions on certain technical matters. Similar provision is made under the Turbine Plant Export Agreement. In the case of turbines these instructions provide that every signatory shall when tendering make use of appropriate specified "protective stipulations" relating to steam

* There is a specified variation in the terms for contracts for the U.S.S.R. and certain Eastern European countries.

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consumption guarantees, standard tolerances, penalty, bonus and guarantee of blading. Signatories may tender without guaranteeing steam/heat consumption, in which case they are to stipulate that "all the figures . . . given . . . are based upon our experience and are those which we expect to obtain on test and are given bona fide": but where guarantees are given signatories must stipulate a standard tolerance (as laid down in the appropriate British Standard Specification*) of at least 2½ per cent., subject to specified increases up to another 3 per cent. in certain circumstances. The maximum penalty which a signatory offers for each 1 per cent. by which the test results vary from the guaranteed figures may not be more than £180 per 1,000 kW (in the case of high pressure turbines†), "or that specified in the purchaser's original enquiry, whichever is the less", unless he gives seven days' notice of his intention to the Secretary, "naming the amount of the penalty which shall be the maximum to be offered and/or accepted" by any of the signatories tendering for the particular enquiry. Signatories must stipulate that "payment of any penalty . . . for failure to meet our guarantee (and which failure we shall in any event be given every facility to make good at the earliest moment) shall be deemed to be as and for agreed and liquidated damages for such failure". The standard form of guarantee to be used by signatories provides for the inclusion of both penalty and bonus; "in order to establish the custom of securing a bonus where a penalty is agreed it is strongly recommended that signatories shall stipulate for a bonus corresponding to the penalty". Permitted tolerances must be increased by a further 5 per cent. for small turbines and 2½ per cent. for large turbines before the purchaser becomes entitled to exercise his right of rejection in accordance with the conditions of contract.‡ No signatory may guarantee the life of turbine blading beyond "the usual twelve months' maintenance".

258. There are provisions of generally similar effect for alternators and condensers.

259. One firm of consulting engineers has said in evidence to us that in its experience British tenderers "almost invariably insist" that their guaranteed tendered efficiencies shall be subject to testing tolerances laid down in the appropriate British Standard Specification. The firm says that these tolerances (up to ±4 or 5 per cent. on guaranteed efficiency in some cases) are generous to the contractor. An analysis by the firm of 37 turbo alternator test results for United Kingdom plant shows that on average measured performance has been rather more than 1 per cent. below guaranteed performance, which, it says, would suggest that some United Kingdom makers are encroaching somewhat on the wide tolerances allowed by the British Standard Specification, although there is nothing to show that this is being done deliberately. A large tolerance makes it unnecessary for a contractor to take remedial measures and the deficient performance remains. From the purchaser's point of view the capitalised equivalent of a 1 per cent. difference in efficiency may be very high and may even perhaps amount to as much as 25 per cent. of the first cost of the plant.§ The firm makes the further points that the amounts of cash penalty and corresponding bonus offered by United Kingdom manufacturers in conjunction with efficiency guarantees are inadequate, afford insufficient safeguards to the purchaser and have remained unchanged for

* Namely BSS 132/1951.

† Figures for tolerance percentages and penalty differ in the case of other types of turbine.

‡ That is, by a further 5 per cent. or 2½ per cent. over and above the tolerances laid down in British Standard Specification.

§ On a similar matter the CEA has told us that insofar as it can deduce the relationship between Group price and efficiency, the price increase for higher efficiencies is nothing like as much as the worth to the Authority of a lower heat consumption.

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many years: higher penalties more in line with current manufacturing costs would favourably impress purchasers that guaranteed performance figures are sincerely estimated.

260. The Groups have told us that the tolerances in the British Standard Specification go back to 1930: they are at present in debate "at a high level" in the engineering field all over the world and it is felt that with the growth in size of machines and the accumulated experience of designers over the years, the tolerances could probably now be somewhat reduced. If the British Standards Institution wished to narrow the tolerances, however, it would not necessarily follow that all Groups would adopt the narrower limits in their own arrangements. The Groups add that penalty and bonus provisions are in practice rarely enforced.

261. The Groups say that performance is affected by design and workmanship, and these are the manufacturer's responsibility. They submit that there is no such thing as perfect workmanship and "turbines made to the same design are likely to show slight difference in performance". The same applies to design itself; "the original design ideas pass through many hands before working drawings are completed" and perfection again cannot be reasonably expected. The manufacturer's guarantee covers the likely errors in design and workmanship; but unforeseen errors may occur, particularly on a new type of machine developed in a hurry, as happened after the war. The Groups contend that "if 37 turbo-alternators showed an average of little over 1 per cent. worse performance than the guarantee, no one who knows all the processes and all the circumstances is likely to complain". They point out that inexperienced operators may cause damage to a turbine and that there is a lack of trained operators in many power stations. They submit that it is "unrealistic to imply . . . that the excess of a little over 1 per cent. is solely due to the manufacturers' imperfections".

262. Finally the Groups submit that "in common sense and in fairness some tolerance on the guarantees or test results is fully justified. Supposing the manufacturers were asked to guarantee and test without tolerance, they would obviously adjust their guarantee to cover the errors in testing.* Then in most cases the purchaser would have to pay bonus; if the turbine is suspected as unsatisfactory it would have to be opened up and rectified at the expense of the purchaser if the unsatisfactory condition (dirt, damage) is due to him. The turbine would then be out of operation for some time at probably serious expense to the purchaser . . .".

(2) Special Rebates on Bought-in Components

263. Until recently two arrangements have operated in relation to the supply of semi-manufactured components for machinery in class (*a*).† We have already referred to one of them, an arrangement between the Condenser Section of the BEAMA and the Condenser Plate Association, now no longer current (see paragraph 73). The arrangement provided for a rebate on purchases by the condenser makers of condenser plates for export land contracts, the amount of the rebate being related to the total volume of purchases by the condenser makers for both home and export contracts

* The Groups say that "the apparatus and instruments which can be used when testing are not always the same, and are liable to a varying degree of inaccuracy in themselves. Moreover, considerable skill is necessary to use these to full advantage. Hence a tolerance on the apparent results of tests is essential and recognised as such by users as well as designers".

† Both arrangements were considered in relation to the suppliers of the components in the Commission's Report on the Supply and Export of certain Semi-Manufactures of Copper and Copper-Based Alloys (HMSO, 1955), paragraphs 106, 110 (*d*) and 317 to 319.

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in a given period : the rebate given was ½d. per lb. if the condenser makers' aggregate purchases amounted to 80 tons or less in any period of six months, and ¾d. per lb. if the purchases amounted to more than 180 tons. The condenser makers who received this rebate are all members of the Condenser Groups.

264. Since 1945 the members of the Condenser Groups, acting for this purpose as the Associated Condenser Makers, have operated an agreement with the Brass and Copper Tube Association which provides for a special aggregated quantity rebate to be paid to the condenser makers, who for their part undertake to confine their purchases of tubes to specified makers of tubes. The rebate rates in this case range from ½d. per lb. on deliveries not exceeding 100 tons in the rebate period of six months to 1d. per lb. on deliveries exceeding 500 tons. The current agreement, which was formally concluded in 1947, supersedes an earlier one.

265. We have been told by the Groups concerned that the cost of tubes amounts on average to about 18 per cent., and that of plate to about 3½ per cent., of the selling price of the condenser.

CHAPTER 12. MARINE EQUIPMENT

266. The two Group agreements relating to marine equipment in class (*a*) (see paragraph 154) are the Marine Turbo-Generator Agreement and the Ship Propulsion Equipment Agreement. They also cover some machinery in class (*b*).

(1) The Marine Turbo-Generator Agreement

267. The Marine Turbo-Generator Agreement, first concluded in 1937, has as its subject matter "any auxiliary steam turbine for generator drive or steam turbo-generator unit for use on board any ship of the Mercantile Marine* or any floating dock, built or fitted in any part of the world irrespective of whether such ship will fly the British flag or not, having an output of not less than 100 kW normal or economical rating or equivalent B.H.P.". The agreement thus covers supply in both the home and export markets of turbo generating units for purposes other than the main propulsion of the vessel. The term turbo generator unit in this context comprises a steam turbine, gearing and generator and in some installations† a condensing plant. There are eight signatories, all of whom are also signatories of some or all of the agreements covering small steam turbo generating units for use on land.‡

268. The agreement provides for the central notification of enquiries and orders, procedure being similar to that described for machinery for use on land (see paragraphs 165 and 166). Every signatory must include in every price tendered by him a sum for compensation for tendering expenses; the method of calculation (though not the formula actually used) and procedure for payment and subsequent distribution are similar to those under the land agreements (see paragraph 168). He must also include, as under the land agreements, a sum to cover the costs of administration (see paragraphs 61 and 178). Every signatory undertakes "not to offer and/or supply plant . . .

* "Plant for use on board ship or floating dock for the British Admiralty, Dominion Governments or for Governments of other Nations" is expressly excluded.

† Where a back pressure turbine is used, a condenser is unnecessary.

‡ Two of the eight joined in 1945.

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at prices lower than those determined by the Secretary . . .". The standard equipment to be included in basis prices for "auxiliary turbo-generator units" is laid down; price corrections "for speeds above 3,000 r.p.m." and for steam consumption are to be made "in accordance with the Land Agreement"; prices for spares are to be agreed through the Secretary. There are no price schedules in the agreement and there is no schedule price factor: for recent orders the schedules in the land agreements have been taken as a basis, the prices derived therefrom being suitably adjusted to cover the differences in specification between land and marine machinery. Prices have been agreed for all enquiries since the inception of the agreement. There are no intercontracting arrangements between signatories.

269. Every signatory further undertakes "to submit his tenders in accordance with BEAMA Conditions of Sale 'B'" (that is, conditions of sale inclusive of erection), to call for specified progress payments during manufacture in all tenders exceeding £25,000 in value, and, in all tenders and contracts, to "use the current BEAMA Price Adjustment Clause and Formula" as set out in the BEAMA "Brown Book". Any signatory guaranteeing steam consumption must stipulate a tolerance of 5 per cent. to cover "errors of observation" (see also paragraph 257).

270. Subject to agreement through the Secretary, the following quantity discounts may be given "from the minimum maintained price for *identical* units on one order":—

Less than 6 sets	Nil.
6 to 11 sets	2½ per cent.
12 sets and over	3¾ per cent.

These discounts are normally allowed. There are no special arrangements with particular purchasers on discounts or other matters.

271. There has been no co-operation on prices between signatories of the agreement and non-signatories.

(2) The Ship Propulsion Equipment Agreement

272. The subject matter of the Ship Propulsion Equipment Agreement, which was first concluded in 1945, is "any ship propulsion equipment either complete with or exclusive of prime movers", including any (i) steam turbo electric, (ii) gas turbo electric, or (iii) diesel electric, ship propulsion equipment of any horse power "supplied for use on board ship built or fitted in any part of the world, irrespective of whether such ship will fly the British flag or not". The five signatories of the agreement are the five large concerns referred to in paragraph 151. For this type of machinery signatories are in competition with the makers of mechanical drives (generally the shipbuilders) or, where propulsion is to be electrical, with Continental and American manufacturers.

273. The agreement is a notification agreement. Arrangements for compensation for tendering expenses are optional, the decision to invoke this provision being dependent on the amount of work involved in preparing a particular tender: the clause has in fact been applied on 13 occasions since 1945, the rates agreed being about 1s. per shaft h.p. Where compensation is paid, it is divided equally among the tendering signatories. There are no provisions for contributions to administration costs.

274. There are no price provisions. Signatories are asked on the standard notification card for enquiries to state whether they desire price maintenance arrangements for the particular enquiry concerned, but no arrangements have in fact been made.

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CHAPTER 13. HYDRO-ELECTRIC MACHINERY

(1) Group Arrangements in the Home Market

275. We have said in paragraph 153 that the only current arrangements concerned with the supply of hydro-electric machinery in the home market relate to the notification of enquiries and orders for water turbine driven alternators under an agreement (the Large Dynamo and Motor Agreement) which is for the most part concerned with machinery in class (*b*). From 1946 to 1952, the Groups also operated a notification agreement (the North of Scotland Hydro-Electric Agreement) the subject matter of which was "any enquiry for any water turbine for the North of Scotland Hydro-Electric Board, having an output of not less than 200 B.H.P.". It was the intention that the agreement should "operate to the advantage of the Signatories by providing means to enable reasonable prices and conditions of contract to be obtained". Procedure for notification of enquiries and orders was generally similar to that described in paragraphs 165 to 167: there were no provisions for compensation for tendering expenses (although on one enquiry compensation was in fact agreed*) or for contributions to an administration fund. There were four signatories. Two of the four were companies which make or procure the manufacture of both water turbines and the associated alternators; the others make turbines only (see paragraph 149).

276. During the life of the agreement orders for water turbines to a total capacity of 856,957 B.H.P. were received by the signatories from the Board. In no cases were prices agreed between the tenderers. The adoption of common minimum prices, to apply to the set as a whole, was discussed but no conclusion was reached; at no time have there been arrangements of this nature between the water turbine builders and the alternator maker signatories of the Large Dynamo and Motor Agreement, and there are no arrangements for common minimum prices for water turbine driven alternators following notification under that agreement.

277. The North of Scotland Hydro-Electric Agreement was terminated in October, 1952, when it had been found that, as the result of the Board's policy of selecting its suppliers and placing its orders for manufacture in Scotland, the agreement served no useful purpose. The Board itself has told us that its policy has resulted in the establishment in the years following 1947 of "a new hydro-electric industry on Clydeside". The Board says that in 1951 and 1952 all its requirements were supplied by four manufacturers. The English Electric Co. Ltd. (English Electric), The Harland Engineering Co. Ltd. (Harland), Gilbert, Gilkes & Gordon Ltd. and Bruce Peebles & Co. Ltd.† The Board continues: "Hydro-electric plant is made for the English Electric Company by Harland & Wolff . . . at Scotstoun, Glasgow . . . In addition John Brown & Co. make turbines for Boving, as Glenfield & Kennedy have also done, and the Harland Engineering Company manufacture complete hydro-electric plant . . . in Alloa." The Board claims that this new Scottish industry "has already built up a large export market equivalent to more than twice" the Board's own requirements, that "the Board's hydro-electric developments have provided for the first time in this country orders for a variety of hydro-electric plant which has had the effect of stimulating exports", and that "the Board's power stations provide a 'shop window' . . . for foreign purchasers to see". The Board's policy is responsible to some extent for the existence of arrangements whereby

* The sum paid was divided equally among the four signatories.

† Bruce Peebles makes water turbine driven alternators but not the turbines. The company is a member of the Large Dynamo and Motor Agreement.

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one company makes hydro-electric machinery for another, and for the choice in such cases of sub-contractors with works in Scotland.

(2) The International Electrical Association Ltd.

Arrangements for Export

278. The two International Electrical Association Ltd. (IEA) notification agreements relating to hydro-electric machinery supplied for export cover respectively water turbines of 5,000 B.H.P. and above (and water turbine installations of 10,000 B.H.P. and above),* and water turbine driven alternators of 2.000 kVA and above. The provisions of these agreements are the same as those of IEA notification agreements relating to steam turbo generating machinery (see paragraphs 165 to 167).

279. There are at present 13 foreign and three British signatories of the Notification Agreement for Water Turbines and 11 foreign and five British signatories of the Notification Agreement for Water Turbine Driven Alternating Current Generators,† and it is in these types of machinery (more particularly water turbines) that foreign manufacturers in recent years have taken the most active interest within the IEA (see paragraph 91).

280. In 1945 four of the five United Kingdom companies which were then signatories of the notification agreements (namely English Electric, The British Thomson-Houston Co. Ltd., Metropolitan-Vickers Electrical Co. Ltd. and Boving & Co. Ltd. (Boving)) entered into the Hydro-Electric Plant Arrangement (HEPA); they were joined by the fifth company (The General Electric Co. Ltd. (GEC)) in 1948. None of the foreign manufacturers concerned (one of whom is an associate of Boving) is a party to the Arrangement. Another United Kingdom manufacturer has joined the turbine notification agreement since 1945, but is not a party to the Arrangement. The Arrangement relates to hydro-electric installations of 1,000 kW capacity and above. It therefore covers a wider field than the two notification agreements and includes equipment outside the scope of our inquiry. As it covers turbines and alternators of a lower minimum capacity than those notifiable under the notification agreements, it supplements the provisions of those agreements by providing that the five parties shall notify enquiries received for turbines of 1,000 kW—4,999 B.H.P. and for alternators of 1,000 kW—1,999 kVA.

281. The resolution of 1945 records that the parties to the Hydro-Electric Plant Arrangement "mutually desire the opportunity of collaborating on the tendering details for all Hydro-Electric Plant of 1,000 kW and upwards in which they are interested, for installation in any part of the world" except the British home market. Under the current text, as amended in 1950, "each enquiry shall be the subject of a Meeting or correspondence to determine the extent of collaboration possible":‡ "in the event of the Parties collaborating in a Price Arrangement on a particular transaction, and [if] prior to the submission of tenders or the official tender date . . . one of the Parties is asked for and is prepared to give or exchange with a

* 5,000 B.H.P. = approximately 3,730 kw. An "installation", although having an aggregate of 10,000 B.H.P. or above, may include individual turbines of a capacity below 5,000 B.H.P.

† Seven United Kingdom companies are concerned (see Appendix 3). One company is a signatory of both agreements.

‡ The provision formerly continued: ". . . it is understood that if competition is expected from tenderers for plant manufactured by a non-Party, collaboration may . . . be found to be impracticable, particularly if the non-Party is a foreign firm". After the amendment of 1950 Boving, which had given notice of resignation from the Arrangement, withdrew the notice.

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non-Party tendering details, then . . . the collaborating generator and turbine Parties shall be informed through the Secretary, and any Party shall have the option to request that the Price Arrangement . . . shall be declared null and void and such a request shall be granted".

282. Enquiries and orders for hydro-electric machinery do not usually cover both turbine and alternator, and the enquiry for one half of a unit may go to a manufacturer who is not a party to the Arrangement. There is no compulsion under the Arrangement for parties to agree common minimum prices on a particular enquiry, and when they do so agreement is between alternator makers for the alternator and between turbine builders for the turbine. Price arrangements for turbo alternator sets as such are not made and the position may arise where there is a price arrangement for one of the component machines in an installation and not for the other. In practice prices are less likely to be agreed on turbines than on alternators, largely because Boving does not supply alternators and is willing to collaborate with alternator makers who are not parties to the Arrangement. Where prices are not agreed, however, the conditions of contract applicable to an enquiry often are.

283. There are no price schedules for hydro-electric machinery, and where prices are agreed they are arrived at by compromise based on the individual parties' suggested selling prices for the enquiry concerned. Each party's proposed price will be related to his estimate of cost, but no breakdown of the total figure is given and the amount of the profit element included in the proposal is not disclosed. There is no general understanding among the parties regarding the level of profit. On receipt of these proposals, and where there are two or more parties, the Secretary calculates and makes known the average of the proposed prices, which he then puts forward as a basis for agreement. The average or a higher or lower figure may be adopted as the result of subsequent discussion among the parties. Considerations taken into account when the average is not adopted are similar to those described in relation to prices for steam turbo generating machinery (see paragraph 200). As in the case of steam driven machinery, the prices agreed for hydro-electric machinery are minimum prices f.o.b.; any additions to the f.o.b. price are based on estimated cost and subsequently adjusted in accordance with expenditure actually incurred.

284. We have examined in detail the IEA's records relating to one enquiry, and we have traced in less detail the history of 21 other enquiries for water turbines and 16 other enquiries for water turbine driven alternators. The enquiries relate to the period 1943 to 1952. They show *inter alia* that in the cases considered the prices proposed for turbines by one of the two companies concerned were generally higher, and at times considerably higher, than those proposed by the other, but for water turbine driven alternators the prices proposed by this second concern were generally markedly higher than those of the other parties making alternators. Agreement on prices both for turbines and alternators was generally reached on the basis of the average of the proposals, though in some cases the agreed price was below the average, and in one case on alternators it was the average of the two lowest proposals.* In all cases tenders were submitted by the parties to the Secretary of the IEA for scrutiny. The cases examined also show that (i) the British parties have experienced strong competition both from foreign signatories of the Notification Agreement for Water Turbines and from non-signatory manufacturers—particularly American and Canadian

* The IEA has told us that after December, 1953 the lowest price proposed usually became the agreed price for the enquiry.

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concerns—who often offered lower prices; (ii) there is considerable scope for alternative designs to meet the purchaser's requirements on a particular enquiry and to make the best use of the geographical conditions of the site.

285. The following table shows the percentage of orders placed with British members of the IEA hydro-electric agreements in 1951 and 1952 on which prices were agreed:—

Year	Water Turbines		Alternators	
	Number of orders	Percentage at agreed prices	Number of orders	Percentage at agreed prices
1951 ...	3 (7 machines)	41·5	9	84
1952 ...	2 (4 machines)	100	6	100

We are told by the British members that shortly before the war United Kingdom manufacturers were in keen competition with one another and jobs were taken at "ruinous" prices. Since 1945 the British members have generally made price arrangements, although exceptionally—and more especially lately—where keen foreign competition is expected a British member who feels that he is able to quote a low price on a particular enquiry may wish to compete independently. *Ad hoc* price arrangements of the kind described above can be agreed only for enquiries where there are two or more tenderers. When, as is usually the case for hydro-electric machinery contracts in the United States, only one of the British members of the IEA tenders, there is no arrangement and the prices quoted will be the manufacturer's own.

286. With few exceptions all price arrangements which have been made have been between United Kingdom manufacturers who are parties to the Hydro-Electric Plant Arrangement. Four non-parties have co-operated on isolated enquiries between 1945 and 1954: of the four, two are foreign signatories of the Notification Agreement for Water Turbines and two are British makers of hydro-electric machinery who were not signatories of either notification agreement. One of the two United Kingdom manufacturers concerned has since joined the Notification Agreement for Water Turbines and the other the Notification Agreement for Water Turbine Driven Alternating Current Generators. The two foreign manufacturers both co-operated on the same two enquiries for water turbines and one of the United Kingdom manufacturers agreed to co-operate on one of those enquiries. The same United Kingdom manufacturer co-operated on one enquiry for alternators and the other on two enquiries for alternators.

287. In addition to co-operating on these two occasions on common minimum price arrangements, foreign manufacturers have also sometimes participated with United Kingdom manufacturers in "protection" arrangements (see paragraph 85). Protection is usually granted to enable the protected party to secure a repeat order or an order for what is in effect an extension or addition to plant already supplied by that party for a particular installation; in some cases it may be granted because the protected party will join a price arrangement on no other terms or it may be a *quid pro quo* for agreement to protect another party on another enquiry. It may or may not be associated with a level price arrangement; if it is not, and protection takes the form of price preference, the protected party gives notice of the price which he intends to quote and the other parties agree to quote higher prices.

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288. From 1936 to 1951* there were ten cases of protection for water turbines and six for water turbine driven alternators. 11 of the 16 cases related to enquiries from two countries; single cases occurred on enquiries from five other countries. The protected party was not always successful in obtaining the order.

289. The British members of the IEA have told us that when there are level price arrangements a purchaser who has already bought from a particular manufacturer will in any case normally give him preference provided that he has been satisfied with the machinery originally supplied and the service given, especially since the spare parts for the machinery throughout the installation will then be interchangeable. The Association adds that where the price to the purchaser is raised by protection the increase is never very substantial and that foreign manufacturers prefer protection to any other form of price arrangement. The Association points out that where water turbines are concerned the foreign manufacturers have a relatively greater influence, and this may account for the fact that protection arrangements have so far applied almost without exception only to hydro-electric machinery. Furthermore, we are told that hydro-electric generating stations are always designed for the ultimate number of generating sets required and that the necessary civil engineering works are initially provided to suit the selected design of turbine. In steam generating stations on the other hand, "they build just so much as is necessary for each stage of the installation, and consequently it is as easy for one firm as another to put down . . . an additional set".

290. In addition to the various types of arrangements described above, the IEA has knowledge of two cases since the war where two United Kingdom signatories of the Notification Agreement for Water Turbines made private "loser" arrangements outside the Association. Both cases occurred in 1950. Both were concerned with water turbines required in Commonwealth countries. In the first case the technical difficulties were too great to allow a price arrangement within the Hydro-Electric Plant Arrangement in the time available, and the two companies agreed that if one of them was successful in obtaining the order it would pay the other a sum of £10,000 "to discourage price cutting and to compensate for bearing costs of tendering". In the second case one signatory originally asked for protection as the machinery was required for an extension to an existing station which the company had equipped, but the other company had been specially approached by the purchaser's consultants. A common minimum price for the enquiry was agreed, including a sum of £500 to be paid to the loser direct and not through the Association.

291. The IEA has no machinery for handling loser arrangements, although the parties may notify the Association of the existence of such arrangements: we have noted among those records of the Association which we have examined a statement that loser arrangements were "quite usual in the past".

* The particulars were sent to us by the IEA in October, 1954 but none of them refers to a date later than 1951.

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CHAPTER 14. ARRANGEMENTS OF INDIVIDUAL MANUFACTURERS RELATING TO MACHINERY IN CLASS (*a*)

(1) Associated Electrical Industries Ltd.

292. In paragraph 151 we said that two manufacturers of machinery in class (*a*)—Metropolitan-Vickers Electrical Co. Ltd. (Metro-Vick) and The British Thomson-Houston Co. Ltd. (BTH)—were wholly owned subsidiaries of Associated Electrical Industries Ltd. (AEI); we also said that in each of the years 1951 and 1952 the two companies were together responsible for 37 per cent. by value of all supplies of machinery in class (*a*) and for over 38 per cent. of home supplies. In view of these facts we felt it necessary to obtain further information about the commercial policy of the two manufacturing companies and the extent to which their influence within the Groups of which they are members is exercised jointly or independently.

293. We are told that historically BTH was "an offshoot" of the General Electric Co. of New York: until the formation of AEI in 1929 the American company had financial control of BTH. Close technical liaison has always existed between BTH and the American General Electric Co. Metro-Vick (previously the British Westinghouse Co.) was established "by the rival American concern, the Westinghouse Electric Co. Effective control from America ceased before World War I, and although a technical interchange agreement continued for many years, British Westinghouse were free to pursue their own line of technical development, and did so". By 1929, when both companies became subsidiaries of AEI, BTH and Metro-Vick "were well established as makers of steam-turbines and heavy electrical plant of markedly different design . . . and each had an important following among the buyers in the world markets". AEI itself has never been American controlled, and the minority interest formerly held by a subsidiary of the American General Electric Co. has recently been disposed of. Since 1929 it has always been AEI's policy "to maintain the autonomy" of the two subsidiary companies "as far as possible". "The executive link with AEI is through the Managing Directors, who are also Executive Directors of AEI. The Executive directorates [of BTH and Metro-Vick] are, and always have been separate and distinct. Until recently . . . liaison between the two companies was maintained by the interchange of nominee Directors." It is now "effected through the Chairman of AEI who is also Chairman of BTH and" Metro-Vick. The factories of the two companies "are entirely self-contained and competitive . . . Preliminary designs and specifications are usually very different in technical features and are prepared independently." The companies do, however, exchange research data and practical experience gained in the operation of their plants, and they work closely together on such matters as the establishment of standards. Each maintains "an entirely separate sales organisation".

294. On the share of the home market for machinery in class (*a*) enjoyed by the two companies, we are told that this "varies rather widely from year to year. Before, and up to, 1945, it usually exceeded 50 per cent." Since the war Metro-Vick's share "has fallen slightly and the BTH share markedly, because of the limitations imposed by factory capacity". Metro-Vick's works "have been extended by stages and are now up to today's needs, although still further expansion to meet the growing market is in hand. BTH expansion could not be started so promptly but a new large turbine factory is under construction in Northern Ireland. The Companies will make every effort to regain, and if possible pass, their pre-war position in the market." When the limitation of factory capacity has been removed "both companies will be able to offer competitive times for delivery, and the BTH Company

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in particular will be able to re-establish the pre-war level of service to its customers, which was largely responsible for its success in securing Home business under conditions of level price. If it did happen that national manufacturing capacity exceeded the total market requirement it would nevertheless be reasonable to expect an increase in the depressed share of the market which the companies have at present; it is common experience that in times of trade recession all competent manufacturers suffer to a similar extent. Any excess capacity would be temporary only, because the demand for electrical generating plant continues to rise at a rate which doubles every ten years."

295. In the light of the results of our investigation of costs and profits (see paragraph 629), neither company appears to be amongst the lowest cost producers of machinery in class (*a*). Having regard to the share of the market enjoyed by the two companies it would seem reasonable to expect them to be amongst the lowest cost producers, and we therefore asked AEI why they apparently were not. We were told that plant such as that in class (*a*) "takes several years to produce, and costs on individual sets are apt to vary widely". If "a running average of 3/5 years, made over a period", were taken, AEI believes that the combined cost figures of its two subsidiary companies "would prove to be among the lowest of those achieved by Trade Group members". AEI would not, however, "expect them to be the lowest cost producers of individual items: both companies manufacture every size of class (*a*) plant, whereas some other companies confine their trade to sizes most profitable to them".

296. We also asked AEI what would be the advantages and disadvantages on the one hand of fuller competition between BTH and Metro-Vick and on the other of a greater measure of rationalisation of their manufacturing resources. AEI has replied that rationalisation of production generally "pays only in the case of 'repetition goods'" and is unsuited to "bespoke products". Rationalisation of the combined resources of the two companies would be inappropriate in the case of steam turbines and steam turbine driven alternators where the companies' designs "differ markedly" from one another, each having "its loyal supporters among buyers; moreover, each of the two producing units is already so large that no saving in cost could be secured by combining them". It is the considered opinion of AEI that "any attempt at rationalisation, or limitation of the commercial autonomy of the two companies could only result in a serious loss of total business. No change of this general policy is contemplated."

297. With regard to the position of the two companies as members of the Groups, we are told that they "compete with each other in every respect except price in exactly the same way that they compete with other members of the price groups, e.g. on design and technical performance, delivery times, service facilities and commercial representation". As both companies "are independently voluntary members of the various price groups, . . . it should be manifest that they see no advantage in being price competitors". As members of the Groups "they act quite independently. When they advocate similar policies, it is on account of like interest and circumstances, not of common direction. It often happens that . . . [their] . . . representatives take opposing viewpoints in Trade Group meetings": while the Chairman "is aware of the broad lines of policy which are being pursued" by each, "he does not give over-riding instructions either directly or indirectly". Representatives of the two companies "consult each other, informally, just as either will, at times, consult the representatives of any other member firm. There is no common direction by AEI and there is no intention to alter this broad commercial policy."

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298. Finally we asked AEI to consider what it would expect the effect to be (i) on the share of the home market enjoyed by the two companies and (ii) on the companies' production policy if the Group price agreements were terminated. AEI has replied that "the existence or otherwise of the Group price agreements should not affect the rate of recovery of the shares of Home business taken by the two companies" which are at present "abnormally low". We are also told that "the price agreements have subsisted for many years . . . and there never has been occasion to consider what might be done in markedly different circumstances. Cessation of price agreements, however, would not have any bearing on the organisation of joint resources of the two companies" because there are major differences in design between the products of the BTH and Metro-Vick and "both traditions are needed to satisfy the market".

(2) Arrangements of other manufacturers

299. Some manufacturers have arrangements with other individual companies which relate either wholly or in part to machinery in class (*a*). Two of these arrangements are relevant to our report. In the first case a British company in 1948 entered into a technical aid agreement with an associated foreign company whereby it receives designs, technical data and information and working drawings against payment of a fee, and accepts certain restrictions on the use of designs; each party also agrees not to supply in the other's specified exclusive territory without the other's consent. The British company has told us that it entered into the agreement in order to preserve and develop its business; it says that the agreement has enabled it to obtain export orders which might otherwise have been placed abroad.

300. The second case concerns an agreement between a United Kingdom manufacturer and a foreign manufacturer under which the British company receives the right to the use of certain designs, test and manufacturing data and experience against payment of an annual fee, and undertakes not to make certain types of equipment except to those designs and not to export machinery of the types concerned without the foreign manufacturer's consent, which consent is to be sought only in exceptional cases. The British company has told us that its production of this class of machinery has never been on a large enough scale to permit the financing of extensive research work; the agreement makes the foreign manufacturer's research available against payment of a fee. The British company is strongly of the opinion that, even with the restriction on exports, the agreement is a valuable one, not only to the company itself "but also to the country generally", particularly because of the high quality of the machines it is thus enabled to produce. The British company "is one of the largest employers of labour in the district and without the . . . Agreement, it would have been quite impossible to maintain in employment nearly as much labour as has been done in recent years".

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PART III—CLASS (*b*) OF THE TERMS OF REFERENCE ALTERNATORS AND GENERATORS OTHER THAN THOSE IN CLASS (*a*) : MOTORS

CHAPTER 15. THE BACKGROUND

(1) The machinery

301. Class (*b*) of our reference consists of A.C. motors of 1 h.p. and over, D.C. motors of 1 h.p. per 1,000 r.p.m. and over, D.C. generators with an output of 0·75 kW per 1,000 r.p.m. and over, and alternators of 10 kVA and over (except turbine driven alternators of 300 kW and over which are included in class (*a*)). It thus includes all electric motors, and all electricity generating plant driven hy prime movers other than turbines, except those of the very smallest capacity. The prime movers which drive the generators in this class, generally oil or steam engines, are not covered hy the reference.

302. All the machinery in class (*b*) is designed to transform electrical energy into mechanical energy or vice versa; all has the same fundamental design consisting of a rotor, that is a rotating core embodying some form of winding, and a stator, that is a stationary form of winding surrounding the rotor. In spite of this hasic similarity there is great diversity in the detailed design of the various types of machines according to the characteristics, such as starting current and speed/load variation, which are required, and these in turn depend on the uses to which the machines are to he put.

303. Electric motors are required for a large variety of purposes in many different industries, each with its own special needs: to meet these purposes and needs a wide range of types and sizes of motors has been developed. Electricity is normally generated as alternating current and most of the motors in use are therefore A.C. motors, many of them heing to manufacturers' standard designs.* The main types of A.C. motors are:—

(i) Induction motors. The simplest and cheapest type of induction motor is the squirrel cage motor which is widely used for driving such equipment as machine tools, conveyors, pumps and fans; but it has certain inherent limitations in performance, particularly as regards starting characteristics. Another type of induction motor is the slip ring motor, which is used for some purposes for which the squirrel cage motor is unsuitahle because of these limitations;

(ii) Commutator motors, which are used for driving lifts, printing presses and other equipment where a variahle speed is required;

(iii) Synchronous motors, which are used where a constant speed drive is essential, e.g. for driving pumps, hlowers and compressors.

The main constructional difference hetween these types is in the form of winding used.

304. D.C. motors can more easily he made to run at higher efficiencies at variahle speeds than can A.C. induction motors. They are therefore used mainly where this characteristic is important, or where an A.C. supply is not availahle, as, for example, on hoard many ships. One important application is in electric traction where D.C. motors, at least in this country, are universal. D.C. motors are also used in hoisting equipment for mines and

* "Standard" here means manufacturer's standard. National standards laid down in BSS 2613 are minimum standards for performance. National dimensional standards have been issued, under BSS 2083, only for 50 cycle squirrel cage totally enclosed fan cooled foot mounted motors for voltages not greater than 650 V and ratings up to 20 h.p. at 1,500 r.p.m. or 25 h.p. at 3,000 r.p.m.

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in drives for rolling mills, when they normally form part of a specially designed composite equipment including a motor/generator unit as well as control gear.

305. In addition to the different characteristics already outlined, motors are contained in different forms of enclosure designed according to need to give varying degrees of protection to the operators or the windings or both. Thus in certain operating conditions, where it is necessary to give extra protection to the interior of the machine, screen protected, drip proof or totally enclosed motors may be employed instead of the more usual "protected" machines. In such places as mines and oil refineries a flameproof enclosure is used.

306. Apart from their application in hoisting equipment and rolling mills, most generators covered by this class of our reference are made to be driven by oil engines; such generating sets are for standby use or for supplying electricity where the demand is small or where other forms of drive are expensive or are not available.

307. A great deal of the machinery in class (*b*) must be made to order, because the technical conditions of the installation are not repeated elsewhere. Conditions at one steel works or colliery requiring electrical equipment for a rolling mill or winding engine, for example, will not be exactly repeated in other steel works or collieries; and similar considerations apply to most large machinery in this class. Even in the case of small motors a high proportion is required for special purposes involving some modification of the manufacturer's standard design. Such motors may be made largely from standardised components, but since the demand for each variation from the standard is small these, too, must be made to order.

308. Where there is sufficient demand for similar machines, savings in cost can be achieved by putting them through the works in batches. Further savings in cost, over and above those due to such "batch" production, can be obtained by "flow" production, using specialised equipment in a factory laid out to produce a limited range of machines. "Flow" production is in practice confined to the smallest A.C. motors of the maker's standard design and to those makers with a large enough market for these machines. It can be applied by a manufacturer large enough to set aside one factory for the purpose or by a smaller manufacturer specialising in a limited range of machines; in either case the particular production unit is intended to meet market requirements only for those types and sizes of machine in most common demand.

309. Subject to some exceptions, the arrangements of the Groups for machinery in class (*b*) draw a distinction between the largest machinery and the rest, that is to say that A.C. motors up to 500 h.p., D.C. motors up to 650 h.p. per 1,000 r.p.m., alternators up to 2,000 kVA and D.C. generators up to 485 kW per 1,000 r.p.m. are governed generally by different agreements from those applying to machines with outputs above those limits.* The International Electrical Association Ltd. (IEA) agreements are concerned only with the largest machines. Accordingly we have found it convenient to refer to these two categories as "small" and "large" machinery respectively, although the distinction is in many ways an arbitrary one. Practically

* The following are exceptions to this classification:—

(i) The Alternator Price Agreement now covers all alternators of 10 kVA and above but until recently it conformed to the general pattern by excluding machines of 2,000 kVA and above.

(ii) The Electrically Driven Rolling Mill (Electrical Parts) Agreement and the Electrically Driven Winding Engine (Electrical Parts) Agreement include equipments with a main drive of 250 h.p. and over.

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all the large machines are made to order, but this is true of a considerable proportion of the small machines as well. Production by batch or flow methods is most commonly applied to the range of standard A.C. motors up to 50 h.p.

310. The main existing British Standard Specification* for electric motors and generators relates to minimum performance and lays down heating limits, insulation, over-load performance and tests: there is also a specification covering dimensional standards for small A.C. motors.† Machines produced by different manufacturers but capable of fulfilling the same functions may differ widely in design, quality of materials and workmanship.

(2) The Pattern of Trade

311. The following table of manufacturers' net sales shows the relative importance of the different categories of machinery in this class in the home and export trades in 1951 and 1952:—

£'000

Category of Machinery	1951			1952		
	Home	Export	Total	Home	Export	Total
Small Motors and D.C. Generators	16,391	5,262	21,653	20,980	5,265	26,245
Small Alternators	2,259	765	3,024	2,578	801	3,379
Large D.C. Generators	147	48	195	59	26	85
Turbine Driven D.C. Generators...	73	9	82	7	3	10
Large Motors and Alternators ...	1,078	948	2,026	1,347	1,023	2,370
Marine Equipment	2,276	289	2,565	2,716	415	3,131
Traction Equipment	1,878	1,297	3,175	1,443	1,812	3,255
Rolling Mill Equipment	1,982	238	2,220	1,923	399	2,322
Winding Engine Equipment ...	179	466	645	353	630	983
TOTAL	26,263	9,322	35,585	31,406	10,374	41,780

It will be seen that in each of these two years sales of small motors and D.C. generators accounted for over 60 per cent. of total net sales. In 1952 export sales amounted to about a quarter of the total sales of machinery in class (*b*), compared with about a half for class (*a*) and two-fifths for class (*c*). Much of the smaller machinery in class (*b*) which is included in home sales is subsequently incorporated in composite plant some of which is eventually exported.

312. There is an important difference between the three classes of machinery in the number of buyers. The home market for machinery in classes (*a*) and (*c*) is dominated by the Central Electricity Authority (CEA) and the Area Boards, but there is no dominant buyer or dominant class of buyer of machinery in class (*b*), although the more specialised types of machine have a limited market.‡ There are also some important variations in the channels of trade in machinery within class (*b*), and in particular between large and small machinery and between the home and export markets.

313. The two most important classes of buyers to which the manufacturers sell are "manufacturing resellers"—that is, purchasers of electrical machinery for sale after incorporation with machinery of their own manufacture in

* The Electrical Performance of Rotating Electrical Machinery—BSS 2613/1955

† Dimensions of 3-Phase Electric Motors—BSS 2083/1954 (see footnote to paragraph 303).

‡ For example, the National Coal Board is the sole buyer in the home market of winding engines, but electrical equipment for these engines forms only a small part of the total sales of machinery in class (*b*).

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composite machines or plant such as machine tools, cranes, lifts and oil engine driven generating sets—and direct users, mostly large industrial concerns. In addition, some of the electrical machinery manufacturers incorporate their own electrical products in composite machinery also of their own manufacture and so fulfil a similar function to the manufacturing resellers. The following table shows the relative importance of these three channels in the home market for each category of machinery in 1952:—

Category of Machinery*	Sold to Manufacturing Resellers	Incorporated in Composite Plant of own Manufacture	Sold to Direct Users	Sold to Other Buyers
	per cent.	per cent.	per cent.	per cent.
Small Motors and D.C. Generators	42·4	9·6	39·8	8·2
Small Alternators	68·1	12·7	16·2	3·0
Large Motors and Large Alternators	12·8	43·8	39·8	3·6
Marine Equipment	61·4	11·3	27·2	0·1
Traction Equipment	17·5	6·0	76·5	Nil
Rolling Mill Equipment	9·6	Nil	90·4	Nil
Winding Engine Equipment ...	6·9	Nil	93·1	Nil

* Turbine driven D.C. generators and large D.C. generators are omitted from this table on account of the very small turnover.

314. Broadly speaking, in the home market sales to "resellers" are more important in the case of small machinery and direct sales to "users" are more important in the case of large machinery. The classification "other buyers" in the table includes electrical contractors and wholesalers: sales to these classes of buyers are appreciable only in the case of small motors and D.C. generators.*

315. Small machines, unless of special design, are generally bought by users or resellers direct from selected manufacturers. But invitations to tender are put out by some buyers even for these machines. Large machines, particularly machines for special purposes which are bought with mechanical equipment, are generally put out to tender, though replacements may be bought from the original manufacturer without the submission of further tenders.† In the case of tenders for composite plant the maker of the mechanical equipment is often the main contractor or the seller of the complete unit: where this is so the final purchaser may specify the maker of the electrical machinery to be used.

316. There is insufficient information available to enable us to make a quantitative assessment of the relative importance of the different types of buyers in export markets. A high proportion of sales are made direct to overseas customers by the overseas branch offices and agents of the manufacturers.

(3) The Manufacturers

317. More than 100 concerns are known to manufacture or recondition machinery in this class of the reference. Many of them are small or are

* Contractors undertake installation for their customers—generally, though not always, the smaller users—and usually buy direct from the manufacturers. In some cases the machinery may be bought by the user but installed on contract.

† Differences in frame sizes, etc. in the designs of different manufacturers may preclude any alternative for replacements.

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only reconditioners,* and 98 per cent. of the total sales in 1952 were accounted for by 59 manufacturers. The 12 largest manufacturers were responsible for about three-quarters of the total and the five largest for half the sales.

318. The following table, which covers all manufacturers whose total sales of machinery in class (*b*) in 1952 were £250,000 or more, gives the names of the principal manufacturers and shows the range of their manufacturing interests in the class:—

Manufacturers	Small Motors and D.C. Generators	Small Alternators	Large D.C. Generators	Large Motors and Alternators	Marine Equipment	Traction Equipment	Rolling Mill Equipment	Winding Engine Equipment
Members of the Groups in 1952*								
W. H. Allen, Sons & Co. Ltd.	X	X	X	X	X			
The British Thompson-Houston Co. Ltd. ...	X	X	X	X	X	X	X	X
Bruce Peebles & Co. Ltd.	X	X	X	X	X			X
The Brush Electrical Engineering Co. Ltd.	X	X	X	X		X		
Bull Motors (E. R. & F. Turner Ltd.)	X				X			
Crompton Parkinson Ltd.	X	X	X	X		X		
The English Electric Co. Ltd.	X	X	X	X	X	X	X	X
The General Electric Co. Ltd.	X	X	X	X	X	X	X	X
The Harland Engineering Co. Ltd.	X	X	X	X				
Lancashire Dynamo & Crypto Ltd.	X	X	X	X				X
Lawrence, Scott & Electromotors Ltd. ...	X	X	X	X	X			
Macfarlane Engineering Co. Ltd.	X	X						
Mather & Platt Ltd. ...	X	X	X	X	X			
Mawdsley's Ltd. ...	X	X			X			
Metropolitan-Vickers Electrical Co. Ltd.	X	X	X	X	X	X	X	X
A. Reyrolle & Co. Ltd....	X	X						
Veritys Ltd.	X	X			X			
Non-Members of the Groups								
Brook Motors Ltd. ...	X							
Electric Construction Co. Ltd.†	X	X	X	X	X		X	

* Some of the Group manufacturers are not signatories of all the agreements covering machinery within class (*b*) of types which they manufacture. All signatories of IEA agreements relating to machinery in class (*b*) are also signatories of the corresponding Group agreements.

† Since 1952 this company has joined the Group concerned with Large Motors and Alternators.

* The annual turnover of the reconditioning trades, as far as we can estimate it, is between £1 million and £1½ million of which nearly two-thirds represents sales and the remainder the value of work carried out in reconditioning customers' goods.

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Manufacturers	Small Motors and D.C. Generators	Small Alternators	Large D.C. Generators	Large Motors and Alternators	Marine Equipment	Traction Equipment	Rolling Mill Equipment	Winding Engine Equipment
Non-Members of the Groups—contd.								
Electrical Power Engineering Co. (Birmingham) Ltd.	X							
Electro Dynamic Construction Co. Ltd. ...	X				X			
Horace Green & Co. Ltd.	X							
Harland and Wolff Ltd.	X	X		X	X			
Higgs Motors Ltd. ...	X	X						
Newman Industries Ltd.	X							
Hugh J. Scott & Co. (Belfast) Ltd. ...	X	X			X			
Small Electric Motors Ltd.	X				X			
J. Stone & Co. (Deptford) Ltd.	X							

319. Only four manufacturers, The British Thomson-Houston Co. Ltd. (BTH), Metropolitan-Vickers Electrical Co. Ltd. (Metro-Vick), The English Electric Co. Ltd. (English Electric) and The General Electric Co. Ltd. (GEC), make virtually the whole range of machinery in this class of the reference. A few others make a fairly wide range and some of them, including W. H. Allen, Sons & Co. Ltd., Crompton Parkinson Ltd. (Crompton) and The Brush Electrical Engineering Co. Ltd. (Brush), either directly or through subsidiary or associated companies, make machinery in other classes. A number have manufacturing interests in plant for driving or to be driven by the generators and motors in this class. Brush, for example, is a considerable maker of small alternators in class (*b*), and, through associated companies which are also members of the Brush Group, is also interested in the production of oil engines, the main prime movers for this type of alternator.

(4) The Group and International Electrical Association Ltd. Agreements

320. There are 19 current agreements relating to machinery in class (*b*), of which 13 are operated by the Groups and six by the IEA. In the table which follows IEA agreements are shown in italics. There are also six further Group agreements which include some machinery in class (*b*); but they are primarily concerned with machinery in class (*a*),* and we have described their provisions and operation in Chapters 6 to 12.

* Turbine driven D.C. generators are in class (*b*) and are covered by the following Group agreements:—

Small Turbine Driven Alternator and Generator Agreement (Home).
Small Turbine Driven Alternator and Generator Price Agreement (Home).
Small Turbine Driven Alternator and Generator Agreement (Export).
Small Turbine Driven Alternator and Generator Price Agreement (Export).
Ship Propulsion Equipment Agreement.
Marine Turbo-Generator Agreement.

(see paragraph 152).

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Category of Machinery	Agreemeot	Scope*	Purpose
General Purpose			
Small motors and D.C. generators.	Dynamo and Motor Agreement.	Home and indirect export.	Notification and price.
	Dynamo and Motor (Export) Agreemeot.	Direct export ...	Notification and price.
Small alternators ...	Alteroator Price Agreement†.	Home and indirect export.	Notification and price.
Large motors, alternators and D.C. generators.	Large Dynamo and Motor Agreemeot.	Home and indirect export.	Notification and compensation.
	Large Electric Machioe Agreement.†	Home aod indirect export.	Price.
	Geoerator Price Agreement	Home aod indirect export.	Notification and price.
	Generator and Motors Notification Agreement.	Direct export ...	Notification.
	Rotating Condensers Notification Agreement.	Direct export ...	Notification.‡
	Rotating Converters Notification Agreement.	Direct export ...	Notification.‡
Special Purpose			
Motors and generators for marine use.	Marine Motor aod Generator Agreement.	Home and indirect export.	Price.
Rolliog mill equipmeot.	Electrically Driven Rolling Mill (Electrical Parts) Notification Agreement.	Home	Notification and compensation.
	Electrically Driveo Rolliog Mill (Electrical Parts) Agreement.	Home	Price.
	Rolling Mill Equipments Notification Agreement.	Direct export ...	Notification.‡
Winding, hoisting and haulage equipmeot.	Electrically Driveo Wioding Eogioe (Electrical Parts) Notification Agreement.	Home	Notification and compensation.
	Electrically Driveo Wioding Engine (Electrical Parts) Agreemeot.	Home	Price.
	Hoisting Equipments Notification Agreement.	Direct export ...	Notification.‡
Electric tractioo equipment.	Railway Traction Electrical Equipment Agreemeot.	Home and export	General consultatioo.
	Trolleybus Electrical Equipmeot Agreemeot.	Home and export	General consultation.
	Electric Traction Equipment Notification Agreement.	Direct export ...	Notification.

* Indirect exports are sales of machinery for use outside the home territory of an agreement which result from eoquiries from addresses within it.

† Large alternators have recently been deleted from the subject matter of the Large Electric Machioe Agreement and added to that of the Alternator Price Agreement, which now covers all alternators in class (*b*).

‡ See paragraphs 323 and 325 for *ad hoc* price and compensation arrangemeots.

The subject matter of each agreement is set out in detail in Appendix 4.

321. As will be seen from the table above, the agreements fall into two main groups: those relating to machinery with a very wide range of uses (for convenience called "general purpose" agreements, though many of the individual machines they cover are carefully designed to carry out particular

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jobs), and those relating only to machinery for certain special uses. Machinery covered by agreements in the latter group is in most cases specifically excluded from those in the former group; where it is not it is nevertheless regarded as excluded in practice. There is no inter-relationship between the machinery covered by different agreements such as exists in the case of machinery in class (*a*), but we mention in paragraph 330 the arrangements between signatories of some agreements covering machinery in class (*b*) and makers of related plant outside the scope of our inquiry.

322. The current Group agreements relating to the supply in the home market of machinery in class (*b*) provide, between them, for:—

(i) common minimum prices for most of the machinery (the principal exceptions being electric traction equipment and machinery for use on H.M. ships), together with a number of supporting practices, such as agreed discount arrangements and uniform conditions of sale and contract;

(ii) the central notification of the more important enquiries and orders, except in the case of traction equipment and marine motors and generators;

(iii) compensation for tendering expenses in the case of most large machinery;

(iv) general consultation between signatories; this is the main purpose of the two agreements relating to electric traction equipment and is one of the expressed objects of the other agreements.

323. The position in the export market cannot be so easily summarised.* But broadly speaking, with the exceptions already mentioned in connection with the home market, there are price arrangements in force under Group agreements for the exports of small motors and small D.C. generators, and for "indirect exports" (see footnote * to table in paragraph 320) of marine motors and non-turbine driven generators, large motors, alternators both large and small falling within this class of the reference, and large D.C. generators. *Ad hoc* price arrangements are also made from time to time on export enquiries for hoisting (winding engine) equipment, rolling mill equipment, rotating condensers and rotating converters notified under IEA agreements.

324. There are notification arrangements in force under Group agreements for the larger export orders for small motors and D.C. generators, for the larger indirect export orders for small alternators, and for all indirect exports of large D.C. generators, large motors and large alternators, and under the IEA agreements for direct exports of some of the larger machinery.

325. The Group agreements make no provision for compensation for tendering expenses on exports of machinery in class (*b*), except for some indirect exports of large motors and alternators and direct exports of motors for driving centrifugal blowers and compressors. *Ad hoc* arrangements for compensation are sometimes made when prices are arranged for certain of the enquiries under the IEA notification agreements.

(5) Membership of the Agreements

326. 23 United Kingdom manufacturers of machinery in class (*b*) are signatories of one or more of the Group and IEA agreements concerned with machinery in this class (see Appendix 3). In the years 1951 and 1952

* The Irish Republic and the Channel Islands are included in the "home territory" of all Group agreements.

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the signatories were responsible for more than 70 per cent. of total net sales of all machinery in the class.

327. Most of the manufacturers making machinery in class (*b*) on a large scale, including the four referred to in paragraph 319 who make almost the whole range of machinery covered by our reference, are signatories of one or more of the agreements. Some are signatories of all the agreements relating to machinery of types which they make, but a number belong only to agreements covering the types in which they are mainly interested. Under the Group system, in those cases where notification and price arrangements for similar machinery in the same territory are covered by separate agreements, the membership of each pair of related agreements is generally the same.* Since the IEA agreements cover only the larger machines in this class they have in some cases fewer signatories than the corresponding Group agreements which cover smaller machines as well.

328. Most of the manufacturers who are not signatories of any agreement are small or have a very minor interest in machinery in this class. There are, however, also a few larger concerns which do not subscribe to any of the agreements; they include in particular one company which concentrates on the production in quantity of a narrow range of machines and is one of the largest producers of electric motors in the United Kingdom. We describe these manufacturers and their products further in Chapter 20.

329. The following table, based on sales in 1952, shows the relative importance by value of signatory and non-signatory manufacturers as suppliers of the principal categories of machines:—

Category of Machinery	Home			Export		
	Signatories of an agreement relating to this machinery	Signatories of an agreement relating to other machinery in class (*b*)	Signatories of no agreements relating to class (*b*) goods	Signatories of an agreement relating to this machinery	Signatories of an agreement relating to other machinery in class (*b*)	Signatories of no agreements relating to class (*b*) goods
	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.
Small Motors and D.C. Generators	63	Nil	37	70	1	29
Small Alternators ...	67	8	25	83	1	16
Large D.C. Generators	95	Nil	5	100	Nil	Nil
Large Motors and Alternators ...	88	6	6	99	1	Nil
Marine Motors and Generators ...	71	Nil	29	81	Nil	19
Traction Equipment	94	6	Nil	100	Nil	Nil
Winding Engine Equipment ...	91	8	1	87	10	3
Rolling Mill Equipment	100	Nil	...	100	Nil	Nil

... = negligible.

The table shows that the entirely independent manufacturers who do not subscribe to any Group or IEA agreements concentrate largely on the smaller

* The Large Dynamo and Motor Agreement (notification) and the Large Electric Machine Agreement (price) are exceptions.

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machines in this class. Since the table takes into account all relevant Group and IEA agreements, whether or not they control prices, it should not be taken as providing an accurate measure of the extent of price competition (see paragraph 345).

330. There are three agreements between the signatories of certain Group agreements and makers of related plant. These are:—

(i) A joint agreement between signatories of the Dynamo and Motor Agreement, the Alternator Price Agreement and the Generator Price Agreement on the one hand and the makers of certain oil engines used for driving alternators and D.C. generators on the other, providing for reciprocal discounts* on certain types of machinery and for general co-operation between signatories; the agreement does not cover exports.

(ii) An intercontracting agreement between the signatories of the Electrically Driven Rolling Mill (Electrical Parts) Agreement and members of the Steel Works Plant Association providing for discounts† on the sale of certain electrical equipment to or through members of the Association.

(iii) An intercontracting agreement between signatories of the Electrically Driven Winding Engine (Electrical Parts) Agreement and the Winding Engine Makers Association, which provides for a discount or handling charge on sales of winding engines to the electrical machinery manufacturers, who are usually the main contractors, or of electrical equipment to the winding engine makers.†

CHAPTER 16. ORIGINS OF THE AGREEMENTS: NOTIFICATION AND COMPENSATION FOR TENDERING EXPENSES

(1) Origins

331. The first agreement relating to machinery in class (*b*) was introduced in 1913. It dealt with the prices of small motors and generators. A notification agreement for large generators and motors followed shortly afterwards. The early arrangements did not operate without interruptions, and it is only since 1930 that the home agreement covering small motors and D.C. generators has been in continuous operation; most of the other current Group agreements were introduced at various times between 1930 and 1946.‡

* See paragraphs 391 to 395 for an account of the discounts on sales of generators. As the oil engine maker is generally the main contractor, the discounts on sales of oil engines to generator makers are of little practical importance.

† See paragraph 400 for details.

‡ The following agreements have been in continuous operation from the dates mentioned:—
Dynamo and Motor Agreement, 1930
Dynamo and Motor (Export) Agreement, 1940
Marine Motor and Generator Agreement, 1946
Alternator Price Agreement, 1935
Generator Price Agreement, 1936
Large Dynamo and Motor Agreement, 1935
Large Electric Machine Agreement, 1942

The Electrically Driven Rolling Mill (Electrical Parts) Notification Agreement appears to have been in operation since 1924 and the Electrically Driven Winding Engine (Electrical Parts) Notification Agreement since 1932. Although not formally completed until 1952, the price agreements (Electrically Driven Rolling Mill (Electrical Parts) Agreement and Electrically Driven Winding Engine (Electrical Parts) Agreement) for rolling mill and winding engine equipment had been in existence in skeleton since 1943 and had been observed in practice before 1952.

The Railway Traction Electrical Equipment Agreement and the Trolleybus Electrical Equipment Agreement (which do not provide for notification or price arrangements—see paragraph 417) were introduced in 1951 and 1950 respectively.

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The first arrangements of The International Electrical Association Ltd. (IEA) were introduced in 1930, and the first of the Association's separate notification agreements in 1936 (see paragraphs 75 and 79).

(2) Notification

332. We have already indicated the importance of the central notification of enquiries and orders in the development of arrangements amongst manufacturers of electrical machinery and have discussed, in relation to the machinery in class (*a*), the existing objects of a notification scheme (see paragraphs 58 and 165 to 167). These general considerations apply equally to the notification of most individually important enquiries and orders for machinery in class (*b*); but since a great deal of machinery in this class is sold in small lots and can be ordered without invitation to tender, the procedure of notification is not practicable in all cases. In this chapter we consider only the extent to which provisions relating to notification exist in the agreements covering machinery in class (*b*), and any significant differences in the form of the notification arrangements.

333. Most enquiries and orders for the small machines which constitute a high proportion, by value, of the total sales of machinery in class (*b*) are not subject to notification arrangements. Under the Dynamo and Motor Agreement and the corresponding export agreement most enquiries and orders of a total value of less than £5,000 for the home market or £2,000 for export are not notifiable; most home and indirect export enquiries and orders for one or more alternators of a total capacity of less than 250 kVA are also exempted from notification under the Alternator Price Agreement,* and there is no agreement which covers direct exports of these machines. The limits in these three agreements have been varied from time to time in the light of market conditions.† For small marine motors and generators there are no notification provisions. This is also true of traction equipment supplied in the home market because, the Groups have informed us, home enquiries for this equipment are usually made public. This case apart, practically all enquiries and orders for large machinery are notifiable under Group or IEA agreements. With the minor exception of a certain special type of motor there is no overlap between the Groups and the IEA in this respect. On the other hand there are certain ranges of machinery which are not covered by any export agreement at all; the IEA is generally concerned only with exports of the largest machinery, and the Groups have not in all cases made agreements to cover, or to cover fully, exports of the smaller machinery which is outside the IEA's scope. Thus, direct exports of alternators of less than 2,000 kVA are not subject to any agreement; and in the case of motors and D.C. generators there is a gap between the upper limit under the Group export agreement (500 h.p. or 485 kW) and the lower limit under the IEA agreement (1,500 kW).

334. Where notification is provided for, the procedure is similar to that for machinery in class (*a*) described in paragraphs 165–167.

(3) Compensation for Tendering Expenses

335. The origin and purposes of arrangements for compensation for tendering expenses have been described generally in paragraph 58, and as applied to machinery in class (*a*) in paragraphs 168 to 174. Much of the machinery in class (*b*) is comparatively simple in design, and heavy tendering costs

* Under the three agreements mentioned there is special provision for notification of all enquiries and orders for a few special types of machine or machines with particular equipment.

† Until 1954 the exemption limit under the Dynamo and Motor (Export) Agreement was £7,500.

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are incurred only for the larger machinery or for complex schemes. Compensation arrangements similar to those for machinery in class (*a*) are applied at present only to certain large machines in class (*b*). Under three Group agreements there are compensation provisions for large alternators and motors and the electrical equipment of electrically driven rolling mills and winding engines supplied in the home market; for large alternators and motors they also apply to some export enquiries. The IEA agreements do not provide for compensation, but ad hoc arrangements are made in respect of some export orders for hoisting and rolling mill equipment and rotating condensers which are notified under the Association's notification agreements. Before 1951 there were also compensation arrangements under the Alternator Price Agreement and the Generator Price Agreement. The arrangements were withdrawn from the Alternator Price Agreement because the increasing ratio of orders to enquiries had reduced the costs of tendering in relation to sales. Although we are told that large enquiries for small machines may also involve heavy tendering costs, there are no arrangements for compensation in such cases.*

336. The Groups' arrangements for compensation for tendering expenses apply to orders for machines of 2,000 h.p. and over covered by the Large Dynamo and Motor Agreement, and to motors above 500 h.p. covered by the Electrically Driven Rolling Mill (Electrical Parts) Notification Agreement or the Electrically Driven Winding Engine (Electrical Parts) Notification Agreement. In the first case the Groups have told us that 2,000 h.p. is the point at which "special design work in general begins and where orders tend to be spasmodic". In the case of rolling mill and winding engine equipment the manufacturers say that they are expected to submit complete engineering schemes which "generally include machines of large size together with a mass of auxiliaries, control gear and operating devices, all essential to the complete installation".

337. The amount of compensation to be paid out by the successful tenderer is calculated in accordance with a formula† based on the output of the machine. As we have explained in paragraph 178, in the Group agreements for machinery in class (*a*) the amount payable by the successful tenderer is added separately in arriving at the prices to be quoted by tendering signatories to the agreement. The prices in the schedules in the three Group price agreements for larger machinery in class (*b*), however, are deemed to include the amount of compensation and no specific addition is made.‡

338. Although the IEA compensation agreements were suspended in 1942, compensation is nevertheless sometimes paid where *ad hoc* price arrangements are made through the Association.§ Up to 1952 compensation arrangements were frequently made for hoisting equipment, but they have been less frequent since that date. Compensation has been agreed on about half the enquiries notified since 1952 under the Notification Agreement for Rolling Mill Equip-

* The Groups have quoted a case where, because of different interpretations which could be put upon the enquiry and because alternative contractors for associated equipment were involved, an enquiry for 200 motors meant the quotation of 6,000 different prices by one tenderer.

† £C$\times\sqrt{\text{kVA or B.H.P. per 1,000 r.p.m.}}$, where C varies from 1·5 to 3·5 for different types of machine.

‡ A signatory of the Large Dynamo and Motor Agreement who is not a signatory of the Large Electric Machine Agreement—the price agreement for similar machines—is thus under obligation to quote a price which includes the amount of compensation, but his quotation may, in fact, be the same as, greater than or less than a quotation from a fellow signatory who is also a signatory of the price agreement.

§ See paragraphs 81 and 82 for an account of the former compensation arrangements of the IEA.

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ments. Where *ad hoc* arrangements are made in the IEA, the amount of compensation to be paid by the successful tenderer is calculated in most cases by using the formulae contained in the suspended compensation agreements.

339. As in the case of machinery in class (*a*), the manufacturers have not attempted to relate the amounts paid in compensation to tendering expenses actually incurred or to make any calculation of those expenses. As a percentage of total business under the relevant agreement, compensation paid by successful tenderers is in all cases very small; over the four years 1949–52 it varied from one half of one per cent. for rolling mill equipment to one per cent. for large dynamos and motors. The Groups concerned with this class of machinery have said that "it has been found through practical experience over the years that the amount included to cover the cost of tendering is on the average adequate, although in certain cases, where preliminary engineering work has to be undertaken before the tender is made, the amount included is often not sufficient".

340. Until 1951 the Groups concerned with machinery in class (*b*) followed the same practice in distributing compensation as those concerned with machinery in class (*a*) (see paragraph 168). The agreements covering large alternators, large motors and electrical equipment for rolling mills and winding engines were amended in 1951, and compensation under these agreements is now distributed as follows:—

Number of Tenderers	Method of Distribution of the Fund
One	All to the administration fund.
Two	One third to the unsuccessful tenderer Two thirds to the administration fund.
Three	One third to each unsuccessful tenderer. One third to the administration fund.
Four (or more)	Equally among the unsuccessful tenderers.

341. The principal differences in current practice for class (*b*) as compared with class (*a*) are that the successful tenderer does not participate in the distribution, and that only actual tenderers—as opposed, in the case of class (*a*), to notifiers of the enquiry or, in some circumstances, all signatories of the agreement—receive shares directly. On the other hand, all signatories can in theory benefit indirectly if compensation is paid into the administration fund. The manufacturers say that this rarely happens; generally all the four signatories of the agreements for electrical equipment of rolling mills and winding engines tender for each enquiry.

342. Under the *ad hoc* arrangements made through the IEA the amount of compensation is divided equally between all the parties to the arrangement including the successful tenderer.

CHAPTER 17. THE PRICE ARRANGEMENTS

(1) Home Market

(A) *General*

343. Most machinery in class (*b*) is subject to one or other of the price agreements under which the signatories bind themselves not to sell at prices lower than the minimum prices provided for in the agreements. These

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common minimum prices are normally derived from schedules by applying certain rules laid down in the agreement, though in special cases a part or the whole of the price may be agreed *ad hoc*; in any event all signatories have to observe the same minimum price for the offer or sale of the same machine to the same buyer. Insofar as there are provisions for varying the price for particular buyers or classes of buyers, the discount or other differential allowance which may be given in each case is also laid down in the agreement. The Groups have told us that in practice signatories of price agreements generally quote the minimum price, although there is one signatory who regularly quotes higher prices. This is borne out by information we obtained in our costing investigation, which showed that in 1952 approximately 94 per cent. of the total value of home sales of machinery in this class which were subject to common minimum price arrangements represented sales at the minimum prices.

344. There are no home price arrangements in force at present for machines made to Admiralty specification for use on H.M. ships, for turbine driven D.C. generators for marine use, or for a number of other products generally not made in quantity or made by only one or two companies (e.g. coal cutter motors and airborne machines).* But traction equipment is the most important category of machinery which is now free from any price agreement (see paragraph 417). Traction equipment has, however, been the subject of certain price arrangements in the past. From 1934 to 1945 there was a home price arrangement, not administered by the Groups, between the principal manufacturers of this equipment. Some of the traction equipment purchased by the British Transport Commission since the war has been supplied under contracts dating from the period when that agreement was in force, and the prices paid have been the prices formerly agreed, as adjusted by the BEAMA contract price adjustment formula. In addition, in one or two cases up to 1950 the manufacturers tendering to the London Transport Executive quoted level prices after discussions between themselves. In each case the enquiries related to railway traction motors of identical design; in some cases the London Transport Executive gave advance notice of its intention to divide its contracts between the manufacturers concerned in order to secure quicker delivery; and in some cases there were joint discussions on price between the manufacturers and the Executive.

345. For the purposes of our costing enquiry we obtained from all signatories of agreements concerned with machinery in class (*b*) returns of their sales in certain years, sub-divided as far as possible in accordance with the classification used by the Groups in drawing up their agreements, but including machines which are not subject to any price agreement. Thus the category "small motors and D.C. generators" includes all machines covered by the Dynamo and Motor Agreement but also machines within the same range of output which are specifically excluded from the scope of that agreement and not covered by any other agreement (e.g. coal cutter motors and airborne machines); similarly "marine equipment" includes all machines covered by the Marine Motor and Generator Agreement but also other machines for maritime use such as those made to Admiralty specification. The following table, which is based on information we obtained from the signatories, shows the extent to which their home sales of each category of machinery in 1952 were not subject to common minimum price arrangements:—

* See Appendix 4 for details of machines excluded from price agreements.

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Category of Machinery	Total Home Sales by Group Members*	Proportion not subject to Minimum Prices	
		Sales not subject to minimum prices	Incorporated in composite plant of own manufacture
	£'000	per cent.	per cent.
Small Motors and D.C. Generators...	13,707	4	4
Small Alternators	1,770	2	4
Large D.C. Generators	56	65	—
Large Motors and Alternators ...	674	7	9
Marine Equipment	2,082	39	5
Traction Equipment	1,363	100	—
Rolling Mill Equipment	1,919	28	—
Winding Engine Equipment	320	1	—
TOTAL	21,891	16	3

* The figures in this column are those of sales (including the value of machinery incorporated in composite plant of own manufacture) by signatories of the relevant price agreement only (e.g. the figure opposite " small motors and D.C. generators " represents sales by signatories of the Dynamo and Motor Agreement), except that in the case of traction equipment, for which there is no price agreement, the figure represents sales by those manufacturers who are signatories of the two agreements providing for consultation.

The table shows that all sales of traction equipment and a substantial proportion of sales of marine equipment were not subject to common minimum price arrangements. The only other categories in which a substantial proportion of the sales was not subject to minimum prices are large D.C. generators and rolling mill equipment. In what is by far the most important single category, small motors and D.C. generators, the proportion of sales not subject to minimum prices was only 4 per cent.

346. Although the price agreements cover a wide range of machinery and there are considerable differences between one agreement and another, there is a common pattern. The basis of the system is a schedule of prices graduated according to speed and output (horsepower, kVA or kW) for machines complying with specifications and performance levels stipulated in the agreements. Further schedules in the agreements provide rules for bringing machines with a different electrical performance within the scope of the schedules, and for additions to or deductions from the listed prices for other variations from the specifications and for extras and accessories. The price so determined is subject to further correction by a price factor to arrive at the normal minimum gross price that may be quoted by signatories. This gross price may be subject to certain discounts provided for in the agreements. Exceptionally, and in certain defined circumstances, prices below the normal minimum gross prices may be quoted (see paragraphs 403 to 408).

347. Machinery in this class is sometimes sold together with switchgear and control gear, which are outside our terms of reference. In some cases the prices of such equipment are specified in schedules in the agreements, in others there are provisions requiring the prices to be agreed through the Secretary or to be " reasonable market prices ".

348. Class (*b*), unlike class (*a*), does not include any non-electrical prime movers; and machines which are covered by one agreement are not normally sold in association with those covered by another. We are not therefore concerned, as in class (*a*), with a series of complementary agreements.

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Although there is a considerable degree of common membership of the agreements concerned with machinery in class (*b*), most of the price agreements have developed independently of one another, and the various bodies of signatories have no occasion to hold joint meetings. The Dynamo and Motor Agreement has the largest membership and is concerned for the most part with relatively simple machines for which there is a very wide market. The machines covered by the Marine Motor and Generator Agreement and the Alternator Price Agreement are also relatively simple but have a more limited market. The remaining price agreements are concerned with more complex plant which is made to the order of a small number of buyers and of which there are fewer manufacturers. The differences between the various agreements arise largely from these differences in the nature of the machinery and in the market.

(B) *The Dynamo and Motor Agreement*

349. The Dynamo and Motor Agreement is the most complex of the agreements concerned with machines in class (*b*). Its price schedules contain prices for basic machines. Only the main characteristics of the basic machines are specified; they must comply with British Standard Specification (see paragraph 310), but in certain cases the agreement itself provides additional stipulated performance levels for features not covered by those specifications. In any event considerable latitude is left to the individual designer and manufacturer; the specified characteristics cover only the electrical performance of the machine and certain safety factors and standards of measurement. For D.C. protected type motors and dynamos alone there are 23 pages of prices for basic machines with a range of outputs from one to 800 h.p. (or its equivalent) and of speeds from 150 to 3,000 r.p.m.; about 125 individual horsepower or kilowatt ratings and about 50 individual speeds are listed within these ranges, making in all approximately 6,000 prices of individual basic machines. Similar price lists, though with somewhat fewer individual machines, are provided for D.C. totally enclosed fan cooled machines, and for continuously rated A.C. motors with various types of enclosure.

350. We describe in paragraphs 588 to 593 the methods by which the price schedules in this agreement have been drawn up. It is sufficient to say here that originally signatories were asked to submit their proposed prices for selected ratings. When compromise figures for these machines had been agreed, these tentative prices were plotted on a graph and adjusted to make a smooth curve from which the prices of other machines were then determined. Since the war the signatories have at various times submitted their individual costs for selected machines, and the current prices of motors forming a very large proportion of the total business transacted are related in some measure to the information so obtained. The agreement now lays down that any meeting of signatories or any committee appointed thereby to consider proposals for the establishment of and alterations to the schedule prices of machines "shall have regard to the weighted average costs of the six lowest cost producers of the rating(s) involved as disclosed by such costs". For this purpose each signatory "shall furnish details of his own manufacturing costs for such rating(s) as the Secretary shall specify", and the costs of each are to be weighted in accordance with his turnover in machines of the appropriate type for "the six calendar months last available". Where wide differences occur in the six lowest costs the appropriate committee "shall recommend what action shall be taken to deal with such differences". For ratings for which costs are not readily available because of infrequent demand "the schedule prices shall be established in reasonable

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ratio to the other schedule prices for the same type of Machines for which costs have been submitted". In practice, the relation between the schedule prices and the costs which have been considered has not been constant (see paragraph 593).

351. Machines made to a non-standard specification with a non-standard electrical performance or with some other variation to the maker's usual design may be required for special purposes. Extras, accessories and spare parts may also be demanded by purchasers. Further schedules to the agreement provide means for calculating the additions to, or in some cases deductions from, the price which must be made in respect of such variations in order to arrive at the common minimum price for the goods ordered.

352. Machines with a non-standard performance may be priced from the basic price schedules by means of "corrections" made to their actual rating or output.* For example, the agreement lays down rules for the corrections to be applied to the actual output if non-standard temperature conditions, non-standard overloads, or other variations from the basic specifications are required. After these corrections have been made, the machine is priced under the agreement as though it were a machine complying with the ordinary specifications but at the corrected rating.

353. It is not feasible to use corrections for all variations to the specifications, and a large number of possible variations are separately listed in schedules showing in each case the addition to be made to the basic price. For example, the price schedules for A.C. continuously rated motors cover only machines of 700 volts and below. For voltages above 700 the scheduled price must be increased by adding a proportion of the price plus a round sum; these extras range from 7½ per cent. of the price plus £180 for voltages 700 to 2,300 to 40 per cent. of the price plus £615 for voltages 9,300 to 12,500. Variations in the non-electrical specifications of a machine may also be required; thus, the purchaser may want a machine with a drip proof enclosure or without bearings or bearing supports or with slide rails. Since drip proof machines are not listed separately their prices are obtained from the schedules for equivalent machines that are not drip proof and 2½ per cent. must then be added to the price. Machines without bearings or bearing supports are charged at 5 per cent. less than the ordinary price. Slide rails are charged at 4 per cent. of the schedule price of the bare machine subject to a minimum extra charge of 16s.

354. As the examples we have chosen show, the agreement attempts to provide for all variations which are likely to be called for and uses a number of different methods for determining the consequent variation in the price, including correction of the actual rating, percentage additions, fixed sum additions and combined percentage and fixed sum additions. None of these adjustments has been calculated from costs submitted by the signatories; they are arrived at by discussion and agreement between the signatories, each of whom makes his own proposals in the light of his own experience and knowledge of the additional costs involved in making the variations.

355. It has been suggested to us by one buyer that the method of fixing the prices for extras and accessories as a percentage of the price of the main machine is in some cases arbitrary and may lead to anomalies such as identical accessories having different prices because they are supplied with machines of different output. The Groups have admitted that this might

* By "actual" output we mean that specified by the purchaser. The Group calls this the "nominal" output. We use the word "actual" to avoid confusion with the "corrected" output, which is also, in effect, nominal.

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happen but defend the method used on grounds of simplicity ; they say that if any serious anomaly came to light it would immediately be corrected.

356. This criticism is directed against a minor feature of the schedules covering additions to the basic machines. Of more importance are the variations in price due to special variations in the specifications of the machines at the request of the buyer. Some of these variations relate to the electrical performance of the machine; others are designed to enable it to fit in a particular space or to be coupled with particular machinery. The manufacture of such machines is not compatible with flow production methods and must always be more costly than the manufacture of standard machines. We have had no evidence from buyers that the extras charged for what amount to special machines are excessive; unless buyers are at the same time buying standard machines of the same type and rating, they would indeed have little opportunity to make comparisons. The Groups have told us that "it is highly probable that extra charges for special variations to basic machines are in many cases by no means sufficient to cover in full these extra costs . . . due to the disturbance of repetition work and flow production," and that "only a well judged mixture of factory standards plus a proportion of specials can enable any motor factory to achieve a reasonable average of cost and price". We discuss this matter further in paragraph 601.

357. The prices taken from the schedules are subject to further adjustment by the application of a price factor. Like the factors which are applied to the schedule prices of machinery in class (*a*) (see paragraph 184) this is intended to take account of general changes in the level of costs due to national wage awards or changes in the prices of materials; but whenever alteration of the factor is considered regard is also paid to market conditions (see paragraph 358). Because of the complexity of the price schedules it is not practicable to revise them whenever the minimum selling prices are to be altered, and in the conditions which have prevailed since the war prices have more often been altered by varying the factor than by changing the schedules. Variations in the factor do not, of course, change the relation between one price and another, but when schedules are revised after consideration of costs these relations may be changed.

358. The Dynamo and Motor Agreement lays down that if amendment to the general level of the schedule prices by means of a change in the price factor is proposed, the signatories or appropriate committee in considering such a proposal "shall have regard to the latest application of the Cost Variation Formula". This is a formula which was first introduced in 1942, though it has been amended since. It is based on the assumption that the total cost of machines is made up, in certain fixed proportions, of the costs of materials, labour, salaries and overheads ("service expenses and standing charges"), and uses published indexes of prices and wages to measure changes in each of these elements of cost. The calculation is made monthly, but the price factor itself is varied only if the signatories so decide after considering not only the result of the calculation but also general market conditions. The Groups have told us, for example, that if the application of the formula shows a 5 per cent. increase in costs they may nevertheless decide that because of increased market competition they cannot afford to increase their prices; the need to keep their factories working to capacity might even point to a reduction in prices, and in any event they would not vary the factor unless changes in costs as measured by the formula were expected to be maintained for some time. The agreement "recommends" that all changes shall be "in multiples of $2\frac{1}{2}$ per cent.".

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We deal more fully with the matter of the price factor in this agreement in paragraphs 595 to 597.

359. The complexity of the agreement is such that an elaborate set of rules is provided laying down the order in which the various operations must be carried out in calculating the correct price of any machine; and a number of "examples of the application of the pricing rules procedure" are given in a special schedule. The signatory must first determine the output, or corrected output, to be used for pricing purposes by following in a given order the rules set out in one schedule. He must then take from another schedule the schedule price for that corrected output, adding where necessary an extra for excess voltage as determined by the same schedule. If the corrected output is intermediate between listed outputs he must take the price for the next higher output listed. Where appropriate he must then amend the price for short time rating. The resulting figure is the schedule price for the machine. The signatory must next calculate the prices of any extras or accessories; these according to their nature are taken from various schedules and are calculated by using the actual output of the machine in some cases and the corrected output in others. These extras are added to the schedule price of the machine, and the current price factor, as indicated in another schedule, is then applied to the total. The resulting figure is the "gross basis price" of the machine without spares. If spares are required, the appropriate extras, expressed as percentages, are listed in a schedule of spares; the signatory must apply the appropriate percentage to the schedule price of the machine and then apply the price factor, giving him the "gross basis price" for the spares. Finally, if the buyer is entitled to a discount (see Chapter 18), the necessary deduction is made to arrive at the net selling price.

(C) *Other Home Price Agreements*

360. The remaining home price agreements concerned with machines in class (*b*) are all simpler in form than the Dynamo and Motor Agreement, partly because each covers a smaller range of machines but in most cases also because they do not attempt to specify the price variation appropriate to every possible variation in the machine but provide to a greater extent for *ad hoc* settlement of the price. Subject to this, the agreements are similar in principle to the one we have just described, that is to say prices are obtained by reference to schedules for basic machines with adjustments for particular variations and a further adjustment by means of a price factor.

361. Until recently the Alternator Price Agreement was concerned only with alternators under 2,000 kVA.* As in the case of the Dynamo and Motor Agreement, the price schedules in this agreement have been revised after consideration of centrally submitted costs (see paragraphs 604 to 606), though the agreement itself lays down no rules for the purpose. The only other case where the signatories have submitted costs is the Generator Price Agreement covering D.C. generators of outputs higher than the limit for the Dynamo and Motor Agreement; the Groups have told us that "these costs confirmed that the existing schedule prices were basically correct and they were therefore not changed".†

362. The prices under the Marine Motor and Generator Agreement are derived from former or current schedules in the Dynamo and Motor Agreement and the Alternator Price Agreement. The agreement covers machines

* Its scope was extended on 1st December, 1955, to cover alternators of 2,000 kVA and over which until then were covered by the Large Electric Machine Agreement.

† We have noted that the price level was nevertheless altered at about the same time by variation of the price factor. The Groups have told us that this was "in common with adjustments made on all other similar agreements".

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for marine use in the same range of outputs as those within the scope of the Dynamo and Motor Agreement and, to some extent, of the Alternator Price Agreement, and the prices have been arrived at by enhancing the corresponding prices in one or other of these agreements in respect of special marine features. The price schedules in the Large Electric Machine Agreement, the Electrically Driven Rolling Mill (Electrical Parts) Price Agreement and the Electrically Driven Winding Engine (Electrical Parts) Price Agreement, all of which cover large and generally complex machines of kinds that are made to order, were compiled without the submission of costs. In each of these cases, the prices were arrived at largely as the result of discussion. Individual signatories proposed prices for selected ratings and a compromise figure was settled for each of these ratings. If prices were required for intermediate ratings, they were determined by plotting a graph of the agreed prices.

363. Some machines covered by these agreements are not included in the price schedules. In such cases prices must be agreed *ad hoc;* the usual method is to take the price for the nearest equivalent machine which is scheduled as a basis for the calculation.

364. Under all the agreements a price factor is applied to the prices obtained from the schedules. In those agreements where the price schedules are not related in any way to submitted costs, the normal method of altering selling prices is to vary the factor, and a complete revision of the schedules themselves is rarely undertaken. Until recently, no price agreement covering machines in class (*b*), except the Dynamo and Motor Agreement, laid down any formula for calculating the factor; but similar formulae have just been, or will shortly be, introduced into most of the other agreements. We have been told also that in practice the signatories of the Alternator Price Agreement and the Marine Motor and Generator Agreement were already applying the Dynamo and Motor Agreement formula and taking the resulting figure into consideration. Under other agreements variations in the factor were agreed after discussion between the signatories, who made their individual proposals in the light of their own knowledge of the trend of costs and of market conditions generally. In most agreements there is a single factor which is applied to all schedule prices, but in the Large Electric Machine Agreement there are different factors for A.C. and D.C. machines and also for certain other goods not covered by our reference.

365. As we have explained in relation to machinery in class (*a*) (see paragraph 180), the minimum prices that may be quoted by different manufacturers for a particular enquiry may differ because the buyer's specification allows scope for supplying machines of different efficiencies. Such situations do not normally arise in relation to the smaller machines in class (*b*); where there are competitive quotations for such machines the manufacturers who are parties to the price agreements normally quote the same prices because their machines, though not identical or necessarily interchangeable, are made to a common minimum level of performance. In the case of the larger machines in this class, however, and particularly of the complicated hoisting and rolling mill equipment, there is considerable scope for variety of offer within the terms of the buyer's specification, and the prices tendered for the same enquiry by fellow signatories of an agreement may vary accordingly.

(2) The Export Market

(A) *General*

366. As in the case of machinery in class (*a*), some exports of machinery in this class are subject to price arrangements under Group agreements,

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others under The International Electrical Association Ltd. (IEA) agreements; but the division of interests is less clear cut in the case of class (*b*). In the first place, all Group price agreements covering home sales of machinery in this class also cover sales to the Irish Republic and the Channel Islands. Secondly, all these home agreements except those concerned with rolling mill and winding engine equipments also cover "indirect exports" (see paragraph 323). Some of these "indirect exports" are home sales for the purposes of our reference, since the machines are delivered to buyers in this country for incorporation in composite plant which is subsequently to be exported; but others are properly regarded as exports since the machines, though ordered in this country, are consigned direct by the manufacturers to overseas destinations. Thirdly, in the important field of small motors and generators the Groups have an agreement, the Dynamo and Motor (Export) Agreement, which covers direct exports. Fourthly, the IEA's arrangements do not fully cover the field which is thus left open to it, namely direct exports of small alternators and of all large machines and also indirect exports of rolling mill and winding engine equipments. As we have explained in paragraph 333, the Association has no notification agreement concerned with small alternators and there are gaps between the lower limits of some of its other notification agreements and the upper limits of the Group's Dynamo and Motor (Export) Agreement; furthermore it now has no specific price agreements for any machinery in class (*b*), though the United Kingdom signatories of some, but not all, of the notification agreements in practice make *ad hoc* price arrangements on some of the enquiries notified. No price arrangements are made through the IEA for traction equipment or for large motors or generators (other than rotating condensers and rotating converters).

367. Thus the export market for machinery in class (*b*) is not as comprehensively covered by price arrangements as the home market for this class or as the export market for class (*a*). The following table, compiled on a basis similar to that used for the table in paragraph 345 from information obtained from the signatories of Group agreements and British signatories of IEA agreements, shows the extent to which their export sales of each category of machinery were not subject to common minimum price arrangements:—

Category of Machinery	Total Export Sales by Group and IEA Members*	Proportion not subject to Minimum Prices
	£'000	per cent.
Small Motors and D.C. Generators	3,652	4
Small Alternators	664	74
Large D.C. Generators	26	15
Large Motors and Alternators	990	35
Marine Equipment	133	84
Traction Equipment	1,812	100
Rolling Mill Equipment	399	Nil
Winding Engine Equipment	547	2
TOTAL	8,223	36

* The figures in this column are those of sales by signatories of the relevant Group price agreement covering exports (or in some cases indirect exports only) or IEA notification agreement.

This table illustrates the points which we have made in paragraph 366, namely that there are no export price arrangements for traction equipment, that considerable proportions of export business in small alternators, marine

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equipment and large motors, D.C. generators and alternators are not subject to price arrangements, but that exports of small motors and D.C. generators and of rolling mill and winding engine equipments are largely covered. The most important category is that of small motors and D.C. generators which represents rather less than half, by value, of all exports by Group and IEA members of machinery in this class; and the proportion not subject to common minimum price arrangements in this case is the same as for the home market, namely 4 per cent.

368. As in the home market, where a common minimum price is agreed that is generally the price quoted by the manufacturers concerned. According to the information we obtained from the Group and IEA members 96 per cent. of the total value of export sales of machinery in class (*b*) which were subject to common minimum price arrangements represented sales at the minimum prices.

(B) *Group Arrangements*

369. In so far as Group home agreements control prices for indirect exports, the provisions are the same. The only Group agreement which is concerned with direct exports, the Dynamo and Motor (Export) Agreement, has price schedules which are identical with those in the corresponding home agreement, and the same rules for pricing variations, accessories, extras and spares; the price factor is also the same. The principal differences between the price provisions for home and export sales in this case are in the discount and rebate arrangements (see paragraph 396) and in the arrangements for quoting agreed prices lower than the normal minimum prices in order to meet outside competition (see paragraph 407). The minimum price agreed in the case of the export agreement is the f.o.b. price, but it is further provided that the minimum prices at which machines may be sold in export territories are the f.o.b. prices with the addition of transport charges, customs duties, insurance, and other similar expenses actually incurred, and that in each territory "an attempt shall be made either to fix the selling price exactly or to such an extent as will make it unlikely that there will be any wide difference between the prices [of] . . . similar products . . . by the various signatories". An exception is made in the case of sales in Canada, the United States and Australia; the signatories must observe the common minimum prices to their "agents and representatives" but there is no obligation to maintain the prices beyond that stage. The Groups have told us that this is because "these are particularly difficult markets in which to sell".

(C) *International Electrical Association Ltd. Arrangements*

370. Price arrangements have been made under the IEA in recent years on individual enquiries for hoisting (winding engine) and rolling mill equipment and rotating condensers and rotating converters for export. The signatories of the relevant notification agreements are now all United Kingdom manufacturers. The following table shows the percentage, by value, of the signatories' export orders for these machines for which prices have been agreed in recent years:—

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	1947	1948	1949	1950	1951	1952
	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.
Winding Engine Equipment ...	28	46	68	47	95	54
Rolling Mill Equipment	98	98	86	97	100	99
Rotating Condensers	7	46	49	Nil	100	100
Rotating Converters	No orders	Nil	Nil	100	Nil	Nil

In 1938, when there were also foreign manufacturers participating in the notification arrangements, approximately 80 per cent. of the signatories' orders for hoisting and rolling mill equipment were at agreed prices, but no prices were agreed for rotating condensers or rotating converters.

371. The prices for these machines are agreed *ad hoc* between the members, and the normal procedure is for members who notify a particular enquiry to state whether they wish to agree a price. Although any price arrangements which are entered into for particular enquiries follow notification under the appropriate agreements, the arrangements are not made under any of the provisions of these agreements and are outside their scope. On rare occasions United Kingdom manufacturers who are not signatories of the agreements have co-operated in the price arrangements.

372. When prices are agreed they are normally arrived at by discussion between the notifying signatories concerned, each of whom may in the first place suggest a different price; that is to say the procedure is similar to that used under the Hydro-Electric Plant Arrangement (see paragraph 283). In the case of rolling mill equipment, however, the prices are taken in the first place from the schedules of the Group home agreement, but the manufacturers concerned do not necessarily apply the current price factor in that agreement; they take into account the prevailing market conditions and the strength of competition expected before deciding the final level of the price.

373. Prices agreed in the IEA are f.o.b. prices. Additional charges for freight, insurance, delivery to site and erection, where required, are agreed by the signatories concerned. These additions are usually in the form of percentages of the f.o.b. price, arrived at in the light of the signatories' individual proposals. Any differences between the charges for these items included in the contract price and the cost actually incurred are adjusted on settlement.

CHAPTER 18. DIFFERENTIAL PRICES

374. In Chapter 17 we have explained the arrangements for determining the normal minimum gross prices. In most of the agreements concerned there are provisions for differential net selling prices for particular classes of buyers, usually by way of discounts or rebates. In some of the agreements there are also provisions under which the signatories can quote agreed prices lower than the normal minimum prices in order to meet foreign competition; this practice is sometimes called "safeguarding". We are concerned in this chapter with both kinds of arrangement in relation to machinery in class (*b*).

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(1) Discounts and Rebates

375. The discount arrangements vary considerably according to the nature of the trade in the particular type of machinery. The market for small standard motors is very different from that for the largest machines in this class, and between these extremes are various kinds of machines many of which are designed for a special purpose and required by a limited class of buyer. For the most part, therefore, the discount arrangements are best described agreement by agreement, but there are one or two points of a more general nature which may conveniently be mentioned first.

376. Cash discounts are permitted under five of the agreements, but only if the quoted price is first increased so that the net price will be not lower than the minimum prescribed by the agreement. Quantity discounts are allowed under two agreements only, the Alternator Price Agreement (see paragraph 398) and the Marine Motor and Generator Agreement (see paragraph 401). The Groups have told us that although the machines covered by these agreements are not normally made in quantities savings in cost could be achieved if quantity orders were placed. They say that similar considerations do not apply to all machinery in this class, and that in the case of small motors and D.C. generators the scale of demand is such that prices are already based on "batch" or "flow" production.* The larger machines are built to carry out a special job and are never ordered in quantity; therefore, the Groups tell us, there would be no point in providing for quantity discounts in the Large Electric Machine Agreement or in the agreements covering rolling mill or winding engine equipment.

(A) *The Dynamo and Motor Agreement*

377. The most elaborate set of discounts and rebates is that provided for in the Dynamo and Motor Agreement. These allowances fall into the following five main groups:—

(i) standard discounts;
(ii) resellers' special discounts;
(iii) users' special discounts and rebates;
(iv) discounts to Government Departments;
(v) discounts to oil engine makers.

(i) *Standard Discounts*

378. The standard discounts under this agreement are:—

Category	*Output*	*Discount*
A ...	1 to 50 h.p. or equivalent	7½ per cent.
B ...	Over 50 up to 250 h.p. or equivalent	5 ,, ,,
C ...	Over 250 h.p. or equivalent... ...	5 ,, ,,

There is a fourth category, D, Control Gear, which is not within our reference.

379. The standard discounts may be allowed to specified nationalised industries and to listed electrical contractors, resellers and exporters. "Resellers" include those buyers who incorporate the machines in composite plant which they subsequently sell. The discount list in the agreement contains over 10,000 names.† Inclusion of any buyer's name in the list has

* See paragraph 601 for further discussion of the prices of these machines.

† The list includes the names of users and others for whom there are special arrangements (see paragraphs 384 and 385) as well as those of buyers to whom the standard discounts are allowed.

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to be approved by the Rebate and Discounts Names Committee appointed by the signatories of the agreement. No specific qualifications for entitlement to the standard discounts are laid down, but the manufacturers have told us that they require to be satisfied that the buyer concerned is conducting a genuine business as a reseller, electrical contractor or exporter; they are normally able to make a sufficient assessment for this purpose from information in their salesmen's reports. Electrical contractors who are members of The NECTA Ltd. (the principal trade association of electrical contractors for England and Wales) are admitted to the list automatically.

380. The only obligation imposed on buyers who are allowed the standard discounts is the maintenance of prices on resale. Since most so-called resales are sales of composite plant assembled by the seller, the obligation is to a large extent a formality unless prices are quoted separately for the motor or generator incorporated in the composite plant or the rest of the plant is also subject to price maintenance. Exceptionally, the whole of the standard discount may be passed on to Government Departments, and resellers whose names are included in a special confidential list may pass on not more than a specified proportion of the discount on sale to other persons whose names are included in that list or to the National Coal Board. This confidential list comprises those manufacturing resellers and users who are allowed special discounts because they buy a certain proportion of their requirements from signatories of the agreement (see paragraphs 382 and 384).

381. Apart from special arrangements which are dealt with below, there are one or two variations from these standard discounts in particular cases. Thus the Central Electricity Authority (CEA) and Area Boards are allowed a discount of 12½ per cent. instead of 7½ per cent. on purchases of standard A.C. induction type motors up to 50 h.p. (included in category A). On sales to associated companies of the signatories discounts of 12½ per cent. and 10 per cent. may be allowed for categories A and B respectively, and "as agreed" for category C.

(ii) *Resellers' Special Discounts*

382. In addition to the standard discounts described above, certain resellers are allowed the following special discounts on machines in categories A and B (except D.C. generators of 18·75 kW and above) provided that the total value of their orders directly or indirectly placed with the signatories of the agreement in the preceding six months reaches a given proportion of their total purchases of such machines in that period:—

Proportion of Orders placed with Group Members	Discounts	
	Category A machinery per cent.	Category B machinery per cent.
Not less than 80 per cent.	2½	2½
Not less than 95 per cent.	5	5
making in all where the standard discount also applies:—		
Not less than 80 per cent.	10	7½
Not less than 95 per cent.	12½	10

383. These special discounts are allowed to resellers approved by the Rebates and Discounts Names Committee and to members of the NECTA approved by the NECTA as well as by the Rebates Committee. A similar arrangement is available to approved members of the Association of Electrical Machinery Trades (AEMT) except that it applies only if 95 per cent. of total

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purchases are made from signatories of the Dynamo and Motor Agreement. Resellers who wish to enjoy these terms have to make a declaration every six months that the value of purchases from members of the Group has been not less than the requisite percentage but they do not bind themselves beforehand; apart from this, there are no special qualifications required from those participating in this arrangement, except that members of the NECTA and the AEMT must carry stocks and be able to give service. The names of those entitled to these discounts, except those of NECTA members, are included in the confidential list to which we have referred in paragraph 380.

(iii) *Users' Special Discounts*

384. Provision is made for special discounts of 7½ per cent. on machines of 1 to 50 h.p. (or equivalent) and of 5 per cent. on machines above 50 and up to 250 h.p. (or equivalent), except for D.C. generators over 18·75 kW, to approved users who have signed an undertaking to buy not less than 95 per cent. of their requirements of such machinery from signatories of the agreement. Users eligible for these discounts are also entitled to an aggregated annual quantity rebate ranging from ½ per cent. where the aggregate annual value of their orders from signatories is £1,000 but less than £2,000 to 3¾ per cent. where the value is £50,000 or more. An additional discount of 5 per cent. is allowed on sales to certain users when the machinery is to be exported. The names of all these users are also included in the confidential list (see paragraph 380).

385. Modifications have been made to this arrangement for some individual large users; for instance, the types of machines covered by the arrangement are sometimes varied. In the case of one very large company, the undertaking to buy 95 per cent. of its requirements from the signatories was changed to 90 per cent. for motors up to 50 h.p. but to 100 per cent. for motors exceeding 50 and up to 250 h.p. This undertaking was cancelled in the middle of 1955, and arrangements between the company and the Group manufacturers now merely provide that the company will buy from the Group manufacturers such quantities of motors as it may from time to time wish to buy. The rebate scale is also varied for some buyers. One very large buyer of a limited range of motors of a completely standard pattern made to his special requirements is allowed an exceptionally high rate of discount on his purchases of those particular motors without giving any undertaking as to the level of his purchases from signatories of the agreement or entering into a written agreement.

(iv) *Discounts to Government Departments*

386. The Ministry of Supply has told us that up to 1943 purchases of motors and generators were made by inviting tenders or, "when there were reasons for dispensing with competition", by placing contracts with selected manufacturers. When tenders were invited, contracts were normally placed with the manufacturer offering the lowest prices; some of the successful tenderers were not members of the Dynamo and Motor Agreement. During the war purchases of motors and D.C. generators were made by Government Departments on a large scale; and in order to facilitate the negotiation of contracts, signatories of the agreement, who for this purpose called themselves the Associated Dynamo and Motor Manufacturers, entered into an agreement with the Ministry of Supply in 1943.* The agreement with the Ministry covered motors up to 250 h.p. and D.C. generators up to 187·5 kW and

* The agreement was actually signed by the BEAMA on behalf of the members of the Group (see paragraph 73).

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provided that prices should be based on the Group's scheduled prices, subject to discounts varying from 10 to 17½ per cent. according to the type of machine and the date of ordering. Variation of the price factor could be requested by either party; the Group's cost variation formula was reproduced in the agreement. There were provisions for fixing the price for a period on "continuous production orders", and for the prices for exceptionally large orders to be specially negotiated. The standard Government contract conditions as to costing were not to apply.

387. The Ministry has told us that it accepted the common schedule prices as then fixed by the Associated Dynamo and Motor Manufacturers subject to the agreed discounts "after having ascertained actual costs of certain machines made by certain manufacturers. The cost plus profit calculated in accordance with the usual procedure for Government contracts and amounting in all up to 10 per cent. on capital employed, showed that the Manufacturers' prices less the agreed discounts were reasonable. At the same time a price variation formula was agreed so that future changes in prices in relation to changes in costs could readily be calculated."

388. In 1947 a new price list, drawn up after consideration of the signatories' costs as at April, 1946, was introduced into the Dynamo and Motor Agreement. The signatories later gave the Ministry's investigators access to these cost figures "and also to the Association's method of dealing with these figures to compile its new list prices" (see paragraph 590). After investigating the position the Ministry found that these costs were virtually the same as the costs in 1943 when adjusted by the price variation factor. The Ministry has told us that the prices under the 1943 agreement were estimated to provide an average profit to the manufacturers of about 10 per cent. on capital. After this investigation of costs the Ministry made a new agreement, and the prices under it were estimated to provide a profit of about 11·8 per cent. on capital.

389. By this time the Ministry's purchases of small motors and D.C. generators were much reduced from the war-time level, and the new agreement covered only motors up to 50 h.p. and D.C. generators of comparable size. Its principal provisions were as follows:—

> *Prices:* "The price . . . shall not exceed the printed schedule price of the Associated Dynamo and Motor Manufacturers plus the current price increase factor less 12½ per cent. . . . It is agreed that the prices are fixed . . . and that the standard [Government] contract conditions as to costing shall not apply."
>
> *Extra large orders:* Orders for duplicate A.C. motors or D.C. machines of a net value exceeding £5,000 are "regarded as being outside the agreement and special consideration shall be given to . . . allowing some further discount".
>
> *Cost variation formula:* For the purpose of assessing an alteration to the Price Factor, the Cost Variation Formula used by the Associated Dynamo and Motor Manufacturers shall be employed.

This agreement is still effective, subject to one or two subsequent amendments. The amendments relate to the acceptance of the BEAMA contract price adjustment clause as an alternative to fixed prices, and of the latest cost variation formula.*

390. Although both agreements were negotiated by the Ministry of Supply, their terms applied to purchases by all Government Departments other than the Ministry of Fuel and Power, which was excluded from the arrangements

* See paragraphs 596 and 597.

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at its own request. No figures are available of business transacted under the agreements, but the following table sets out, for certain years covered by the current agreement, the value of purchases made by all Government Departments (including the Ministry of Fuel and Power) of A.C. motors with an output of 1 to 500 h.p. and D.C. motors and generators of 1 to 650 h.p. (i.e. including machines over 50 h.p. or equivalent which are outside the scope of the agreement) from all manufacturers of any importance:—

	1947	1951	1952
	£'000	£'000	£'000
Group	11	132	415
Non-Group	58	238	458
TOTAL	69	370	873

(v) *Discounts to Oil Engine Makers*

391. The Dynamo and Motor Agreement provides for discounts to be allowed on sales of generators to certain oil engine makers. As far as this agreement is concerned the arrangement is the equivalent for these machines of the resellers' special discount arrangements already described, although no undertaking is given to buy any minimum proportion of requirements from the signatories of the agreement. The arrangement also resembles in some respects the intercontracting arrangements between manufacturers of machinery in class (*a*) (see paragraphs 246 to 250), since oil engines are the prime movers with which the generators in class (*b*) are normally coupled. The arrangements for discounts to oil engine makers are partly governed by the Oil Engine Makers Joint Agreement. This is an agreement between the signatories of the Dynamo and Motor Agreement, the Alternator Price Agreement and the Generator Price Agreement for the one part, and certain oil engine makers who are signatories of price agreements covering certain specified oil engines for the other part. Although, therefore, it is relevant to arrangements under some of the other agreements with which we are concerned as well as the Dynamo and Motor Agreement, and is in fact of more importance in connection with alternators, it is convenient to deal with all its provisions here.

392. In 1935 the manufacturers of certain oil engines entered into agreements to control the prices of those engines. A number of the engine makers were also manufacturers of generators or were associated with manufacturers of generators, so that although the price of the engine was governed by this agreement, they could, when quoting for complete generating units, put the generator in at a very low price; the price of the complete set would not therefore be uniform with that quoted by an oil engine maker who had to buy a generator from another maker. A joint agreement between the oil engine and generator makers was therefore concluded in 1938 to establish, *inter alia*, preferential discounts off the prices of engines and generators of certain defined specifications when purchased by members of the two Groups from each other. Until revised in 1951, the joint agreement included certain exclusive trading provisions. An undertaking was given by both sides to "avoid as far as possible sending enquiries for engines [generators] . . . to non-signatory engine builders [generator makers] and quoting for such non-signatory engines [generators]".* When it was necessary to offer non-

* The two sides gave reciprocal undertakings; the alternative words in square brackets were in the engine builders' undertaking.

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signatory plant it was provided that the prices quoted should not be lower than those quoted by signatories for similar machines. If an order resulted, any difference between the price of the signatory and the non-signatory equipment was to be paid into a central fund.

393. All the clauses relating to exclusive trading were deleted at the time of the 1951 revision. The current agreement covers the sale in the home market of D.C. generators exceeding 30 kW and alternators up to 2,000 kVA and certain specified types of oil engines. Its principal provisions are as follows:—*

(i) "The Signatory Generator Makers [Engine Builders] will allow to any Signatory Engine Builder [Generator Maker] from the gross price quoted to him for a Generator [Engine], on the condition that no portion of such discount will be passed on to the purchaser, a special discount on Generators [Engines]" as set out in schedules to the agreement; the discounts range from 2½ to 7½ per cent.

(ii) Signatories "undertake that the net price quoted to any non-Signatory" for machines "within the scope of this Agreement shall not be lower than the Gross Price quoted to a Signatory . . . except as specially provided in" (viii) below.

(iii) "The Signatory Generator Makers [Engine Builders] will co-operate with the Signatory Engine Builders [Generator Makers] to the fullest extent desirable, taking into account at all times, the essential interests of all parties in regard to the issue of enquiries for" subject matter.

(iv) Signatories "will endeavour to quote lump sum prices for Engines and Generators".

(v) "Signatory Generator Makers [Engine Builders] undertake that the net price quoted direct to a Purchaser in the Territory other than an Engine Builder [Generator Maker] shall not be lower than the Gross Price quoted to a Signatory . . . for a Generator [Engine] under this Agreement, except as specially provided for . . ."

(vi) "The Signatory Generator Makers recognise that it is advisable for the Signatory Engine Builders to be the Main Contractors . . ."

(vii) "The Signatory Engine Builders undertake that in respect of any provisions in their Agreement applying to Generators, a Signatory Generator Maker shall be placed on an equal footing with a Generator Maker who is also a Signatory Engine Builder."

(viii) Signatories undertake that "in the event of Generators being required for use . . . with oil engines which are not covered by the Engine Builders' Agreements but are the subject of *ad hoc* price maintenance arrangements made by the Engine Builders, the . . . Agreement shall apply, as between the Generator Makers . . . and . . . the parties to such *ad hoc* arrangements."†

(ix) Signatory generator makers are prepared to supply signatory engine builders with generators for use with engines outside the subject matter of the agreement in accordance with the terms of this agreement but they reserve the right to supply on the same terms to any other engine builder.

* See footnote to paragraph 392.

† The oil engine makers have informed us that in fact their price arrangements are confined to engines of the kinds listed in the joint agreement.

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394. Sales of oil engines under this agreement amount to no more than 3 per cent. of the total output in this country of all types of oil engines but no figures are available of non-signatory sales of engines for driving generators. Similarly, there are no figures available of the proportion of generators sold under the joint agreement and within its particular limits of size, speed and application, but the manufacturers have told us that it is the majority of such generators exclusive of sales for marine use and for export. The oil engine makers who are parties to the joint agreement have provided the following figures showing the breakdown of their sales of engines for driving generators according to the source of the generators :—

	1950–1	1951–2	1952–3	1953–4
	per cent.	per cent.	per cent.	per cent.
Engines to drive:—				
generators of engine makers' own or associated company's manufacture ...	57	94	97	95
signatory generators of other manufacture	16	5	3	3
non-signatory generators	Nil	0·5	Nil	2
generators supplied by purchasers of oil engines	9	0·5	Nil	Nil
generators not classified	18	Nil	Nil	Nil
TOTAL	100	100	100	100

395. Under the Dynamo and Motor Agreement the same discounts as are specified in the joint agreement must also be allowed on sales of generators for use with certain specified oil engines to four listed engine makers who have agreed to become parties to a similar agreement and are prepared to co-operate with other makers of similar engines. They may also be allowed on sales of generators :—

(i) to other named oil engine makers for use in the home territory with other specified oil engines ;

(ii) for the use of British Government Departments and the Crown Agents anywhere.

(B) *The Dynamo and Motor (Export) Agreement*

396. The only discounts allowed under this agreement are those to branch offices, associated companies, agents or other overseas representatives of signatories. Exceptionally, a discount of 20 per cent. is allowed on sales to Canada of most types of A.C. 60 cycle motors from one to 10 h.p.

(C) *The Alternator Price Agreement and the Generator Price Agreement*

397. The arrangements under these two agreements are broadly similar. Provision is made for discounts of 5 per cent. or 7½ per cent. on sales of alternators and generators to certain oil engine makers in accordance with the joint agreement (see paragraph 393) and to certain other oil engine makers who have agreed to become parties to a similar arrangement in relation to some types of engine not covered by the joint agreement. They may also be allowed on sales of alternators and generators to:—

(i) certain other oil engine makers for use with certain other types of oil engine ;

(ii) makers of steam or gas engines ;

(iii) manufacturers of prime movers and listed exporters buying for use outside the home territory.

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APPENDIX 3

(Referred to in paragraphs 60, 91, 161, 326 and 460)

PART I. TABLE SHOWING THE MEMBERS OF GROUP AGREEMENTS AND THE BRITISH MEMBERS OF INTERNATIONAL ELECTRICAL ASSOCIATION LTD. AGREEMENTS COVERING MACHINERY IN CLASSES (a), (b) AND (c)

(i) The abbreviated titles of agreements used in the table are those used by the manufacturers. A key to the abbreviations is given in Part II of this Appendix. IEA agreements are marked with an asterisk

(ii) All the manufacturers named below are members of the BEAMA with the exception of those marked**.

(iii) All British signatories of IEA agreements are members of the corresponding IEA Sections. The numbers of foreign signatories of notification agreements are shown in footnote (1)

Company	CLASS (a) TURBINES, ALTERNATORS & CONVERTERS																																				CLASS (b) MOTORS, ALTERNATORS & D.C. GENERATORS																				CLASS (c) TRANSFORMERS			
	Steam														Export																								Motor																				Export																		

APPENDIX 14

TABLE 8

(Referred to in paragraph 40)

COMPARISON OF GROWTH IN INSTALLED GENERATING CAPACITY AND PRODUCTION OF ELECTRICITY IN SELECTED COUNTRIES

Index Numbers, 1932 = 100

	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	Actual, 1954(a)
Australia																								
Installed Capacity	Available from 1937 only—see below					158	174	187	205	228	230	265	266	273	276	300	333	361	370	419	451	480	520	13,031
Electricity Production (T)	100	108	116	128	141																			
Belgium																								
Installed Capacity (T)	100	102	107	111	112	116	120	124	122	122	124	123	119	122	122	123	125	131	134	145	154	161	162	3 540
Electricity Production (T)	100	99	102	113	125	141	134	142	106	122	126	128	94	115	136	183	200	207	215	241	240	249	268	10 571
Canada(c)																								
Installed Capacity	Available from 1935 only—see below					173	164	177	180	209	235	257	249	245	255	270	276	289	315	352	379	401	431	69 978
Electricity Production (T)	100	106	130	142	155																			
France																								
Installed Capacity(c) (T)	100	105	108	112	112	117	119	121	120	109	109	109	108	117	122	129	136	145	155	154	175	187	200	19 302(b)
Electricity Production (T)	100	110	112	117	124	134	139	148	126	136	135	142	108	124	154	174	197	203	225	256	273	278	305	45 570
India																								
Installed Capacity(d) (P)	100	113	119	127	134	149	153	139	166	170	168	175	180	185	193	203	209	228	254	372	306	342	378	2,484
Electricity Production	Available from 1939 only—see below																							
New Zealand																								
Installed Capacity(c) (P)	100	133	132	153	153	133	178	179	186	169	202	211	219	222	241	249	272	299	299	298	305	353	365	888
Electricity Production(e) (P)	100	103	110	124	137	151	170	196	228	232	245	261	273	284	304	312	342	365	372	415	429	464	527	4,389
South Africa																								
Installed Capacity (T)	100	110	124	131	150	173	191		229	230	235	240	246				290	307	311	320	331			2,722(b)
Electricity Production (T)	100	111	124	142	173	201	223	247	269	285	293	289	302	313	322	330	336	376	408	438	471	502	550	14,634
Sweden																								
Installed Capacity (T)	100	105	110	115	123	127	136	143	149	153	161	167	184	189	194	202	211	223	239	260	279	308	326	6,267(b)
Electricity Production (T)	100	109	123	141	151	163	156	185	176	186	200	225	253	276	250	275	287	327	371	395	419	457	483	23 701
United Kingdom																								
Installed Capacity(b)	100	108	108	119	114	121	127	132	136	147	159	163	165	167	170	176	187	197	212	230	250	269	289	21 253
Electricity Production(b)	100	110	124	140	160	180	191	206	222	240	273	285	294	286	317	326	356	375	420	436	473	499	534	74,706
USA																								
Installed Capacity (T)	100				102	104	109	115	119	126	134	141	143	147	147	152	162	170	193	210	227	231	277	118 878
Electricity Production (T)	100	103	111	120	137	147	143	162	181	216	235	269	281	273	271	309	339	347	391	436	466	517	548	344 645
Western Germany																								
Installed Capacity	Available from 1948 only—see below																							
Electricity Production (T)	100	110	132	151	173	198	224	244	253	264	276	284	270	128	162	189	234	279	317	370	403	436	489	67 872

Earliest year for which figures are available = 100

	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	Actual 1954(a)
Australia(f)																								
Installed Capacity (P)	—	—	—	—	—	100	108	120	127	130	134	137	142	149	151	160	165	169	175	183	193	219	253	3,417
Electricity Production (P)	—	—	—	—	—	100	108	116	327	140	155	163	166	170	173	187	208	226	238	264	283	304	343	13,031
Canada(f)																								
Installed Capacity (P)	—	—	—	100	102	105	107	109	113	116	122	134	156	133	137	134	140	180	164	176	193	216	—	(3 864)(11)
Electricity Production (P)	—	—	—	100	109	119	112	122	129	143	160	174	174	172	179	187	182	151	208	236	255	281	297	69 136
India																								
Installed Capacity (P)	—	—	—	—	—	—	—	100	105	107	106	111	113	117	122	127	132	144	160	172	193	215	233	2,484
Electricity Production (P)	—	—	—	—	—	—	—	100	111	108	129	141	152	163	139	167	187	201	209	240	251	274	308	7 322
Western Germany																								
Installed Capacity (T)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	100	113	127	140	148	161	—	15,850
Electricity Production (T)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	100	119	133	158	173	186	209	67 872

Sources: League of Nations Year Book, United Nations Year Book and Ministry of Fuel and Power

(T) = Total (P) = Public Utilities only

(a) Installed Capacity expressed in MW except where otherwise indicated and production of electricity in millions of kWh.
(b) Twelve months ending 30th June of year stated
(c) Includes Newfoundland from 1946
(d) 1940–44 excluding Moselle, Haut Rhin and Bas-Rhin 1942–44 also excluding Corsica
(e) Expressed in MVA
(f) 1932–38 undivided India 1939 onwards—area now in Indian Union

(f) At 31st March of each year
(g) Twelve months beginning 1st April of year stated
(h) Relates to 1952
(i) Excluding Northern Ireland. Including railway and transport generating stations throughout period for electricity production and from 1948 for installed capacity
(11) Relates to 1953

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